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THE DEVELOPMENT OF A VISUAL-VERBAL MEASURE OF GENERAL CREATIVITY--THE SYMBOL TEST OF ORIGINALITY. FINAL REPORT.

BY- BURGART, HERBERT J.
RICHMOND PROFESSIONAL INST., VA.

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THE SYMBOL TEST OF ORIGINALITY (STO) WAS STUDIED AND MODIFIED TO SUBSTANTIATE ITS USEFULNESS AND TO MEET SEVERAL CRITERIA FOR TEST CONSTRUCTION--FREEDOM FROM INTELLECTUAL BIAS, SIMPLICITY, OBJECTIVITY, AND DIRECT RELATIONSHIP TO A GENERAL CREATIVITY FACTOR. FROM AN ORIGINAL GROUP OF 4,500 PERSONS RANGING IN AGE FROM 10 TO 25 YEARS, FROM FIFTH GRADE THROUGH COLLEGE, A RANDOM SAMPLING OF 600 WAS DRAWN, BASED ON GRADE LEVEL PERCENTAGES WITHIN THE GENERAL POPULATION. THE FINAL POPULATION NUMBERED 478 WITH 12 SUBGROUPS. THREE MODIFIED VERSIONS OF THE STO AND THE ORIGINAL VERSION WERE SELECTED ALONG WITH ITEMS FROM KISELBACH'S TEST OF AESTHETIC DISCRIMINATION, THURSTON'S HIDDEN FIGURES AND MUTILATED WORDS TESTS, GUILFORD'S BRICK USES TEST, AND MODIFIED FORMS OF TAYLOR'S RELATIONSHIP TEST AND OF A SELF CONCEPT RATING SCALE. BIOGRAPHICAL DATA WERE ALSO GATHERED. THE BATTERY WAS GIVEN TO THE 4,500 SAMPLE, AND ITS ANALYSIS YIELDED VARIABLES OF GENERAL CREATIVITY, VISUAL PERCEPTION, MATURATION, PROCESS STRATEGY, SELF CONCEPT, AND BIOGRAPHICAL INFORMATION. FOLLOWING DATA ANALYSIS WHICH INVOLVED COEFFICIENTS OF CORRELATION, PRINCIPAL COMPONENT FACTOR ANALYSIS, AND VARIMAX ROTATION OF FACTORS, FOUR SIGNIFICANT FACTORS WERE OBSERVED--GENERAL CREATIVITY, INTELLIGENCE, PROCESS STRATEGY, AND MATURATION. CONCLUSIONS MADE WERE (1) THAT GENERAL CREATIVITY COULD BE ISOLATED, ALTHOUGH IT IS A COMPOSITE OF VARYING PROPORTIONS OF SEVERAL PRIMARY CREATIVITY ABILITIES, AND (2) THAT THE CRITERIA SET FOR THE MEASURE WERE APPROPRIATELY MET. A 13-ITEM REFERENCE LIST AND 92-ITEM BIBLIOGRAPHY ARE INCLUDED. AN APPENDIX CONTAINS THE STO, VARIABLE DESCRIPTION, VARIABLE ANALYSIS 15-41, SYMMETRIC CORRELATION MATRIX, ROTATED MATRIX OF FACTOR LOADINGS, AND PROJECT TEST BATTERY. (AA/JP)

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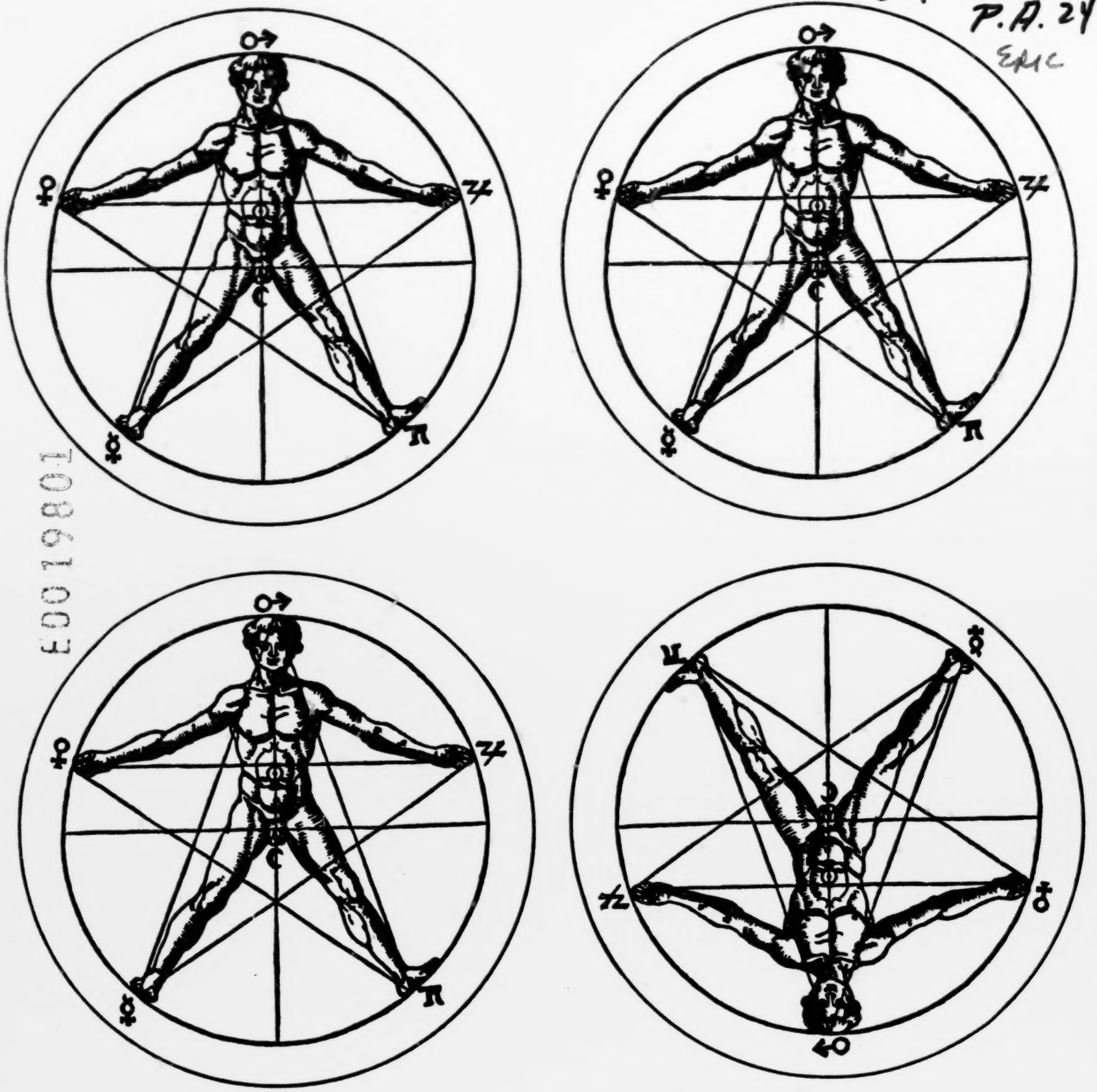

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Final Report

February 1968

HERBERT J. BURGART

Richmond Professional Institute
Richmond, Virginia

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Richmond Professional Institute

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SUMMARY

An attempt was made through this study to substantiate the potential usefulness of the Symbol Test of Originality, a visual stimuli-verbal response measure of general creativity. Within that substantiation were also several criteria for the measure which were to be met, specifically; free from intellectual bias, simple, objective and directly related to a general creativity factor.

Several experimental modicications of the existant Symbol Test of Originality were developed and included in a battery of measures which upon administration and analysis yielded variables of; general creativity, visual perception, maturation, process strategy, self-concept and various biographical information. The battery was administered to approximately 4,500 individuals ranging in age from 10 to 25 years, and in grade levels from fifth through college. From this general population a random sampling of 600 was drawn based on grade level percentages evident within the general population. The final population sampling numbered 478 and reflected 12 sub-groups.

Data analysis included the computation of means, standard deviations and coefficients of correlation for 41 variables on each subgroup as well as the total sampling. The coefficient of correlation matrix was submitted to principle component factor analysis and finally to a Varimax rotation of factors. Analysis permitted the emergence of four significant factors: The primary and dominant, "General Creativity"; "Intelligence"; "Process Strategy", and; "Maturation".

The existence of distinct factors of general creativity, intelligence, strategy and maturation let to the conclusion: That "general creativity" while a composite in varying proportions of several primary creative abilities could be isolated and identified through the primary creative ability of originality as measured by the Symbol Test of Originality. In addition, findings substantiated that the criteria for the measure, set forth in the objectives of the study, were appropriately met.

INTRODUCTION

The ultimate goal of any research into general creativity, and its primary value to society, is the development of an acceptable insight into human creative potential. Early identification, as well as sensitive analysis of change within the human condition, regarding creative potential, can meaningfully enhance the conservation of, perhaps, the most important of human resources.

That general creativity is a prime concern among educators goes unquestioned. Herein lies the foundation of a meaningful learning experience. This concern is heightened by the fact that traditional, "discursive" means of measuring creativity have relied heavily, if not entirely, on other than visual communicative processes. This is, in itself, a limiting factor in attempting to identify creativity where visual perception may play a critical role. Much research may be negated by the elimination of visual reaction processes which contain the potential for culture-free and less intellectually dependent testing sets.

A comprehensive review of literature in the general area of creativity reveals that the preponderance of empirical and scientific research has been accomplished in the relatively short period of time since 1950. When one partials out theoretical discussion, there remains a paucity of hard-core research from which to draw serious conclusions or derive logical implications. This combination of recency and rarity stems from the fact that the concept of creativity itself is relatively new, dynamic, and, indeed, elusive. Unlike the relatively stable intelligence studies of the past, from which creativity studies have taken their procedural format, attempts to identify meaningful attributes served only to uncover further variables rather than isolate static criteria for further in-depth studies. Thus as Hercules, faced with the nine-headed Hydra, researchers into creativity now realize the need to cauterize each identifiable variable in order to maintain a reasonable focus on a given characteristic. It is further understood that in attempting to control each contributing variable in order to clarify or isolate a particular trait, this necessarily changes the efficiency, quality and character of the particular Hydra under study. It should be easy to see then how the early studies of Guilford (7), in attempting to isolate essentials of creative behavoir, returned to an extensive and ultimately complex theory of the structure of human intellect. This was an obvious attempt to map out viable directions and graphically demonstrate, insofar as possible, the interrelatedness of the creativity milieu. Later studies, built upon the logical premise of Guilford's theories, attacked the creative personality, the creative process, environmental conditions leading to creative endeavor, biographical elements of creative individuals and the creative product as separate entities. Such

recent creativity studies have attempted to delve into various human strategies based on diverse criteria. Results of these projects point up similar conclusions: that while a "general creativity factor" may exist, its innate complexity, derived from the unique interaction of the individual, setting, process and ultimate product, demands a persistent, albiet dynamic, pattern of verification. The simple-minded notion that such verification relies almost entirely upon the sensitivity and validity of predictors of a "general creativity factor", becomes the underlying premise from which this study builds.

The Problem:

The need for simple, direct and yet reliable measures of general creativity has long been felt by researchers in this complex area of concern. Measures utilized in the majority of past studies have been seriously hampered by the necessity for a subjective evaluation of the response and/or product previous to any final application in terms of analysis. A second, and more serious, shortcoming of general creativity measures is their reliance on an entirely discursive discipline. Taylor and Holland (10), have adequately pointed out the fact that "creativity" tests are measuring intellectual processes and that non-intellectual characteristics are not necessarily related to high intelligence test scores. Such valid criticism is directed at the understandable contamination by measures which reflect a definite intellectual orientation and, in turn, produce an undeniable bias in favor of verbal-intellectual prowess. This problem certainly contributes to the existing controversy among researchers regarding the relationship of I.Q. and creativity.

This study attempts to attack this problem through the development of a more objective measure of general creativity, taking into account the need to eliminate, insofar as possible, any intellectual bias. At the same time, any such measure must draw upon the heart of previous creativity studies and reflect meaningful commonalty therein.

Early comparisons by Guilford (7) and Brittain (4), indicate that originality, or uncommonness of response, is a key factor in assisting in the indentification of creativity or its potential. Taylor (9), asserted that the existence of a verbal originality factor in their findings leads to the hope for an analogous non-verbal measure of originality. The problems inherent in eliminating certain intellectual factors in order to access the role of originality was approached by Barron (1), and finally partialing out these effects discovered meaningful patterns of originality emerge. Finally, the regular appearance of originality or uncommonness of response in researchers' priority lists, describing necessary characteristics of general creativity, provided this study with the pivotal element around which an attempt at developing a meaningful general creativity measure was made.

Background:

Through a series of logical progressions, over a period of five years, the "Symbol Test of Originality" (5), hereafter, "STO", was developed. From a totally verbal orientation to a visual stimulus-verbal response measure, a substantial amount of groundwork has been laid preceding the present study. The STO is derived from an earlier measure, the "Symbolic Identity Measure of Abstraction-concretion", or SIMAC (6), developed for utilization with college level students. As the STO was further refined and revised for use with diverse age and experience levels, its design reflected critical issues in educational measurement. It was so designed that:

1. It may be objectively scored

2. It may be simply and quickly administered with a minimum of previous training.

3. It measured, by the nature of its scoring structure, originality or uncommonness of response, among a given group.

Review of Literature:

For the most part, research into creativity has focused on either the nature of creativity and the creative individual, or has explored specific isolates or characteristics such as, flexibility, originality or independence. As Taylor and Holland state, "Much of the research reported (is) directed toward finding concomitant characteristics of creativity that should eventually permit building tests of creativity potential" (10).

Pioneers in the area of creativity testing relied heavily on traditional means of gathering information. Guilford (7), and Brittain (4), both concerned with general creativity, explored creativity from a common base of past theory toward arriving at a common "structure" to better understand this complex field. Somewhat later, Torrance (12), devised new measures with a common criteria from which a problem solving approach was utilized. Taylor relied heavily on peer and supervision judgment and Beittel's early contributions, on behalf of art education's potentially unique research tool (3), prepared the way for utilization of product judgments as measurement in creativity. Each of these explorations into creativity testing relied on verbally oriented measures. Therefore, they were less direct and often cumbersome and time-consuming measurement tools.

Welsh, as early as 1935 wrote of originality's role in human imagination. He later states, "We distinguish creative from non-creative activity in terms of its being original and practically or aesthetically valuable" (13). Guilford, in delineating specific characteristics common to the creative individual says:

> "The more ideas a person can have per unit of time, the greater the possibility of coming up with a good idea, other things being equal...(this) approach measures a trait or ability that can be called originality" (7).

In support of Guilford, Taylor lists primary dimensions of creativity described in existing literature, "...characteristics as most likely to be valid measures of creative talent: originality, adaptive and spontaneous flexibility, etc. (10). Both Brittain and Guilford in their early work in creativity list originality as a primary force emerging over and over as a significant criteria which differentiates between "more or less creative" groups.

Thus the selection of originality as the pivotal characteristic from which to explore the complex labyrinth of creativity was not an *arbitrary one.* Precedence for this rationale has been set through both theoretical and empirical literature.

If the research knowledge regarding creativity is relatively scanty, one could safely say that knowledge regarding non-discursive measurement in creativity is minute. In spite of this fact, the potential inherent in non-discursive measurement remains great, though untapped.

By way of background, Langer writes:

> "Man's superiority in the race for self-preservation was first ascribed to his wider range of signals, his greater power of intergrating reflexes, his quicker learning by trial and error; but a little reflection brought a much more fundamental trait to light, namely his peculiar use of 'signs'. Man, unlike other animals, uses 'signs' not only to indicate things, but also to <u>represent</u> them... Signs used in this capacity are not <u>symptoms</u> of things, but symbols." (8).

Langer goes on to add:

> "The power of understanding symbols, i.e. of regarding everything about a sense-datum as irrelevant except a certain <u>form</u> that it embodies, is the most characteristic mental trait of mankind. It issues in an unconscious, spontaneous process of <u>abstraction</u>, which goes on all the time in the human mind: a process of recognizing the concept in any configuration given to experience, and forming a conception accordingly." (8)

And finally, Langer, commenting on abstractions created by and through the eye, points out:

> "Visual forms--lines, colors, proportions, etc., are just as capable of articulation, i.e. of complex combination, as words. But the laws that govern this sort of articulation are altogether different from the laws of syntax that govern language. The most radical difference is that visual forms are not discursive...the symbolism furnished by our purely sensory appreciation of forms is a non-discursive symbolism peculiarly well suited to the expression of ideas that defy linguistic 'projection'. Its primary function, that of conceptualizing the flux of sensations, and giving us concrete things in place of kaleidoscope colors or noises, is itself an office that no language-born thought can replace." (8)

Barron's work with visual stimuli, through which the "Barron-Welsh Art Scale" (1) was developed, evolved from a series of factor analytic procedures using the Welsh Figure Preference Test as source material. This is primarily a synthetic approach to measurement structure whereby responses are matched against "expert" sorting of line drawings. As with earlier measures, the Art Scale suffers from initial and subsequent standards which lose efficacy with time, training and environmental conditions.

Objectives:

Specifically, the objectives of this study set forth to:

1. Develop and refine visual-verbal models of general creativity measures devoid of an intellectual bias, which would be applicable to individuals and/or groups with a broad age and experience range;

2. Provide an adequate comparative base of accepted measures of general creativity against which new models may be examined in terms of establishing the existence of a "general creativity" factor;

3. Submit such experimental measures and related general creativity measures to a general school population sampling for subsequent analysis;

4. Provide researchers initially, and educators, upon adequate validation, with a comprehensive, valid, sensitive, and economically feasible measure of general creativity;

5. Add to the basic research literature, information regarding the potential, limitations, and feasibility of such a visual-verbal measure of general creativity;

6. Establish a sound base upon which valid group norms may be set forth regarding such general creativity measures as may be developed.

7. Build upon findings herein, as well as through existing literature, toward the eventual development of non-discursive measures of general creativity.

METHOD

The initial time portion of this study concentrated on the development of new measures of general creativity as well as the construction of an appropriate battery of tests from which to draw meaningful data. In the design of additional measures of general creativity, attention was given to the need for alternate forms, as well as to item validation.

Three modified versions of the STO were developed and tested with pilot groups for external reliability. Reliability coefficients in each case gave adequate justification for their inclusion within this study. Each modification relied on the previous success and validity of earlier models of the original STO in its construction, incorporating various symbol changes but maintaining the same general format. (see appendix A).

Once the four versions of the STO were set, the entire project battery was selected, with necessary modifications and refinements for the purpose of the given project. The area of visual discrimination was examined through the utilization of ten items from "Kiselbach's "Test of Aesthetic Discrimination" and L.L. Thurstone's "Hidden Figures Test" and "Mutilated Words Test". Due to limitations of time and the size of the battery, only ten items from Thurston's "Hidden Figures Test" were incorporated in the battery.

Available general creativity measures were screened carefully in order to arrive at as comprehensive an inclusion as possible within the space and time limitations of the battery. In order to adequately cover the variety of general creativity measures, or those reflected in the literature as having some relationship to the area of general creativity, representative portions of larger, general sets were selected. Guilford's "Brick Uses" test, a modified form of Taylor"s "Relationship Test, and a modified "Self Concept Rating Scale", which has demonstrated some value in discriminating between high and low creative ability, were incorporated in the battery. In addition, a biographical data form was utilized in order to gather pertinent information regarding peer and sibling relations, intellectual ability, environmental conditions, etc., in an effort to provide for the necessity of later partialing out modifying variables.

A selected population of approximately 4,500, ranging in age from 10 to 25 years, was drawn from public and private schools and colleges throughout ten states. Following administration of the battery of measures, a random selection from twelve sub-groups of the original population was developed on a percentage basis of respondents in grade-level groupings. The present study, with a total population of 478 was drawn from a random sampling of 600 respondents out of the original population of 4,500. Of the 600 respondents selected,

478 provided complete data, the residue of which offered incomplete or inadequate information and were eliminated from the sampling. The population sub-groups are as follows:

TABLE 1. Population Sub-groups

Sub-group Number	Grade-level	N
1	Fifth	33
2	Sixth	27
3	Seventh	122
4	Eighth	30
5	Ninth	47
6	Tenth	68
7	Eleventh	51
8	Twelfth	69
9	College	31
	TOTAL	478

Following the necessary coding and scoring of the raw data, the test battery yielded 41 variables of varying intensity and import. Within the 41 variable format, test data was submitted to the following analytic processes:

1. Means, standard deviations and correlation coefficients for all variables were computed on each of the twelve sub-groups as well as the total population. The "Symetric Correlation" (COREL) program was used for these computations.

2. The resulting symetric correlation matrix from step one was submitted to factor analysis utilizing the "Principal Components Analysis" (FAN) program. This program solves successively for the most dominant factors represented in the correlation matrix. Eight factors were specified in advance.

3. Finally, the "Varimax Rotation" (VROT) program, utilizing the factor analysis output described in step two, was performed This is an orthogonal rotation, on an arbitrary matrix of factor loadings, using the normal varimax criterion. This process results in a unique (within tolerance limits) matrix of factor loadings. All programs utilized in the above computations are on file at the Computation Center of The Pennsylvania State University.

RESULTS

Through depth analysis of the possible alternative relations of existing variables, four significant factors emerged, which serve to substantiate the stated objectives of this study.

The first and dominant factor appearing, from among the eight specified in advance, is that of "General Creativity", (see table 2), wherein a modified form of the STO appears as the factor axis.

TABLE 2. FACTOR 1: "General Creativity"

Variable Number (in order of factor loading)	Variable Measure
8 (Factor AXIS)	Originality
6	Originality
2	Originality
14	Originality
9	Fluency
4	Fluency
11	Flexibility (Functional)
3	Flexibility
13	Self-concept (Creativity)

Appearing in their highest factor loading across each of the eight factors specified are all variables selected as representative of general creativity measures from the existing literature as well as the remaining three originality variables derived from the STO set.

The second factor emerging from analysis is labeled "Intelligence" since the factor axis is that of scholastic achievement (see table 3). Also supporting this designation is the fact that reading habits, two of the three highest loadings on this factor, relate directly to general intelligence and/or scholastic achievement.

TABLE 3. FACTOR 2: "Intelligence"

Variable Number (In order of factor loading)	Variable Measure
19 (Factor AXIS)	Scholastic Achievement
26	Reading Habits
28	Work Environment
27	Reading Habits

The appearance of the variable relating to "work environment", also

reflects a high motivation stemming from general intelligence as well as a form of independence, again, highly related, if only indirectly, to intellectual ability.

Five questions within the Biographical Data Form yielded variables which form the third factor, "Process Strategy" (see table 4). Developing on "product praise' as the factor axis, the four variables demonstrating their highest factor loading are; "product satisfaction", "process flexibility", "leadership", and "goal focus".

TABLE 4 FACTOR 3: "Process Strategy"

Variable Number (in order of factor loading)	Variable Measure
40 (Factor AXIS)	Product praise
39	Product Satisfaction
38	Process flexibility
41	Leadership
37	Goal Focus

Each question forming the above variables relates directly to process strategy either in the form of actual and personal strategies or indirectly through strategy rewards from outside sources.

The fourth factor of significance to this study develops around chronological age as the factor axis (see table 5). Designated as "Maturity", this factor reflects each variable within the matrix which is directly related to experience, more basically, to normal maturation processes.

TABLE 5. FACTOR 4: "Maturity"

Variable Number (in order of factor loading)	Variable Measure
15 (Factor AXIS)	Chronological Age
18	Grade Level
21	College Art Experience
29	Television Viewing (incedence)
5	Visual Perception
7	Aesthetic Discrimination
20	Elementary School Art Experience
1	Visual Perception

The appearance of three measures of visual perception in their highest

factor loading, in relation to chronological age or maturity, becomes a meaningful commentary on concomitant influences.

The remaining four factors yield little by way of significance to this study. They are, for the most part, a synthetic grouping of variables of only incidental interest and appear in detail in the appendix.

DISCUSSION

Variable Analysis:

For the sake of clarity and further delineation of variables, each will be discussed separately, but clustered according to the area of concern each relates to within the study. Pertinent analysis in relation to both sub-groupings and the total population will be presented in tables following each cluster discussion.

Variables one, five and seven represent the "visual perception" segment of this study. Variable one, Thurstone's "Hidden Figures Test", is made up of ten items selected from the measure's original set and is scored according to standardized procedure. Variable five, another of Thurstone's standardized measures of visual perception, the "Mutilated Words Test", contains 26 items scored for correct responses. Kiselbach's "Test of Aesthetic Discrimination" is represented in variable seven. It is composed of seven items drawn from the original set and scored for correctness of response.

TABLE 6: Variable 1: Visual Perception
Thurstone's "Hidden Figures Test"

Subgroup	Grade/level	N.	$\bar{X}$	S.D.
1	5th	33	5.545	2.611
2	6th	27	7.407	1.947
3	7th	122	7.074	2.201
4	8th	30	6.833	2.276
5	9th	47	8.362	1.466
6	10th	68	8.221	1.899
7	11th	51	8.647	1.683
8	12th	69	8.435	2.097
9	College	31	8.774	1.564
	TOTAL	478	7.736	2.191

TABLE 7: Variable 5: Visual Perception
Thurstone's "Mutilated Words Test"

Subgroup	N.	$\bar{X}$	S.D.
1	33	6.970	2.974
2	27	6.741	3.789
3	122	8.295	3.518
4	30	8.700	3.687
5	47	12.319	4.001
6	68	12.794	3.815

TABLE 7 - continued

Subgroup	N	$\bar{X}$	S.D.
7	51	12.451	4.022
8	69	13.203	3.488
9	31	13.258	3.941
TOTAL	478	10.651	4.411

TABLE 8: Variable 7: Aesthetic Discrimination
Kiselbach's "Test of Aesthetic Discrimination"

Subgroup	N.	$\bar{X}$	S.D.
1	33	4.273	1.442
2	27	3.926	1.920
3	122	4.352	1.700
4	30	4.200	1.270
5	47	4.957	1.668
6	68	5.603	1.738
7	51	28.922	8.861
8	69	28.957	8.353
9	31	28.290	8.490
TOTAL	478	25.956	8.907

It is interesting to note the resolution with which the visual perception cluster appears in factor four, "Maturity". These measures were included within the project battery in order to permit the partialing out of such variability from the "General" creativity factor, as indeed, factor analysis accomplished. While a secondary issue within this study, the appearance of visual perception or discrimination as a modifier of creativity in previous studies, must now come under careful scrutiny. This is especially true since each of the three perception variables loaded heaviest on the maturity factor indicating a closer connection with chronological age than has previously been acknowledged.

Variables two, six, eight, and fourteen make up the "Symbol Test of Originality" set within the battery. Variable two is the original STO measure with variables six, eight, and fourteen presented as modified or experimental versions of that measure. Each test is scored for originality or uncommonness of response according to a structured scoring scheme. Weighted scoring yields a possible range from 0 to 60 on each test. Details regarding scoring of the STO may be found in the appendix.

TABLE 9: Variable 2: Originality
Original STO-A-3

Subgroup	N.	$\bar{X}$	S.D.
1	33	21.909	10.456
2	27	19.556	8.092
3	122	19.697	9.260
4	30	24.833	9.135
5	47	23.596	8.985
6	68	25.588	11.543
7	51	25.941	12.830
8	69	26.522	8.176
9	31	25.581	7.987
TOTAL	478	23.418	10.136

TABLE 10: Variable 6: Originality
Experimental STO-B-3

Subgroup	N.	$\bar{X}$	S.D.
1	33	22.333	9.013
2	27	22.407	7.727
3	122	23.238	8.017
4	30	22.300	9.813
5	47	26.872	8.811
6	68	30.265	9.058
7	51	5.529	1.447
8	69	5.217	1.653
9	31	5.839	1.416
TOTAL	478	4.897	1.724

TABLE 11: Variable 8: Originality
Experimental STO-C-3

Subgroup	N.	$\bar{X}$	S.D.
1	33	23.364	9.525
2	27	21.370	7.747
3	122	22.910	8.368
4	30	20.300	6.603
5	47	27.681	8.315
6	68	29.471	8.211
7	51	6.647	2.152

TABLE 11 - continued

Subgroup	N.	$\bar{X}$	S.D.
8	69	6.464	2.180
9	31	28.290	8.490
TOTAL	478	25.956	8.907

TABLE 12: Variable 14 Originality
Experimental STO-D-3

Subgroup	N.	$\bar{X}$	S.D.
1	33	22,788	8.108
2	27	24.630	7.191
3	122	25.566	8.436
4	30	23.433	5.746
5	47	28.255	8.229
6	68	31.868	8.515
7	51	29.510	9.052
8	69	28.174	8.307
9	31	30.129	8.221
TOTAL	478	27.441	8.625

Each of the STO variables scored for originality appear within the dominant factor of this study, with variable eight, an experimental version of the STO acting as a factor axis. The fact that all STO related variables appear within the same factor is not surprising, but their appearance together with other selected indices of general creativity confirms one of the primary objectives of this study. The cluster of general creativity variables within factor one points to the existence of a "general" factor which in past studies was only theorized or, at best, hinted at through ranging implications. Further, with the STO providing the factor axis in the dominant factor, and each subsequent STO measure lending the heaviest loading within that factor, one must face the obvious assumption that the predictive value of the STO is at least equal to that of comparative general creativity measures utilized herein.

Completing the general creativity cluster of variables under discussion are variables: three-item variation between STO measures; four-Guilford's "Brick Uses Test; nine, ten, eleven, and twelve-all variables from a modified form of Taylor's "Relationship Test" (11), and;

variable thirteen, a self-concept rating scale.

Variable three was included to reflect the respondents variance on the same item or items appearing in several STO measures. Scoring ranges from 0 to 5, the higher score representing greater variance or flexibility in response. Details regarding scoring of this measure appear in the appendix.

TABLE 13: Variable 3: Flexibility
Item Variance between STO Measures

Subgroup	N.	$\bar{X}$	S.D.
1	33	1.152	1.439
2	27	.815	.921
3	122	.975	1.250
4	30	.667	.802
5	47	1.021	1.260
6	68	1.544	1.470
7	51	1.039	1.356
8	69	1.319	1.388
9	31	1.387	1.542
TOTAL	478	1.128	1.325

Variable three,"item variance" was inserted initially as an item reliability check with several smaller pilot populations. Further analysis indicated that the scoring structure lent itself to another, more critical interpretation, that of gauging a respondents ability to resist repetition of response within the short duration of the test battery. As a variable of flexibility, its inclusion within the resultant general creativity factor, justifies, in part, the scoring structure utilized.

Guilford's "Brick Uses Test", scored for fluency appears as variable four. This standard measure of general creativity has demonstrated its strong intercorrelation with other measures within Guilford's early creativity battery as well as with a substantial number of comconly accepted "general creativity" measures.

TABLE 14: Variable 4: Fluency
Guilford's "Brick Uses Test"

Subgroup	N.	$\bar{X}$	S.D.
1	33	10.091	4.939
2	27	13.111	4.941

TABLE 14 - continued

Subgroup	N.	$\bar{X}$	S.D.
3	122	13.566	5.255
4	30	12.700	5.305
5	47	14.660	4.320
6	68	17.000	6.771
7	51	14.510	5.331
8	69	14.406	5.459
9	31	16.581	5.038
TOTAL	478	14.259	5.635

Variables nine, ten, eleven, and twelve are differing versions of scoring within the "Relationship Test". This is a modified form of Taylor's original measure which, lacking comparative data as to its interrelatedness with other creativity measures, has nonetheless been used extensively. Variable nine is scored for fluency of response, variable ten for component responses, variable eleven for responses of function and variable twelve for form identity. According to Taylor, form response is the highest creative reaction with function and composition following in that order of importance. Previous studies (5) utilizing this measure have indicated fluency and function scoring as pertinent, but component and form responses as having little or no relation to general creativity.

TABLE 15: Variable: Fluency
"Relationship Test"

Subgroup	N.	$\bar{X}$	S.D.
1	33	3.606	1.999
2	27	4.889	1.502
3	122	4.754	2.070
4	30	4.733	2.518
5	47	5.915	1.898
6	68	6.324	2.033
7	51	6.647	2.152
8	69	6.464	2.180
9	31	6.161	1.573
TOTAL	478	5.559	2.230

TABLE 16: Variable 10: Component Identification
"Relationships Test"

Subgroup	N.	$\bar{X}$	S.D.
1	33	0.818	0.635
2	27	0.741	0.447
3	122	0.664	0.540
4	30	0.933	0.365
5	47	0.787	0.549
6	68	0.897	0.650
7	51	1.176	0.888
8	69	0.681	0.696
9	31	0.935	0.512
TOTAL	478	0.816	0.634

TABLE 17: Variable 11: Function Response (Flexibility)
"Relationships Test"

Subgroup	N.	$\bar{X}$	S.D.
1	33	5.548	2.611
2	27	1.593	1.047
3	122	2.098	1.769
4	30	1.967	1.671
5	47	2.234	2.248
6	68	3.603	2.081
7	51	3.804	2.615
8	69	3.652	2.006
9	31	3.903	2.055
TOTAL	478	2.889	2.144

TABLE 18: Variable 12: Form Response
"Relationship Test"

Subgroup	N.	$\bar{X}$	S.D.
1	33	1.061	1.435
2	27	2.593	1.600
3	122	1.922	2.122
4	30	1.833	2.718
5	47	1.936	2.058
6	68	1.824	2.109
7	51	3.373	10.651

TABLE 18 - continued

Subgroup	N.	$\bar{X}$	S.D.
8	69	2.087	1.845
9	31	1.323	1.536
TOTAL	478	2.040	3.968

Under variable thirteen is presented a self-concept score which is arrived at by totaling the respondents numerical self-estimate on 21 items. This measure has proven to be of value in the realm of personal identity with creativity on an individual level and has held up well in terms of reliability. Each of the 21 items reflect one or more personality traits of individuals studied and found to demonstrate high creative activity and output (1). In further studies with Junior High School students, the author found the self-concept rating approach to be a most helpful tool in sorting high and low level creative response groups (5).

TABLE 19: Variable 13: Self-concept
"Self-concept Rating Scale"

Subgroup	N.	$\bar{X}$	S.D.
1	33	77.515	20.333
2	27	67.074	16.026
3	122	68.131	16.912
4	30	74.333	10.908
5	47	67.532	9.971
6	68	71.426	11.967
7	51	67.235	13.580
8	69	73.406	9.543
9	31	73.968	9.901
	478	70.563	14.152

For the purposes of this study, considering the objectives stated herein, the presence of every general creativity variable within the dominant factor, "General Creativity", serves to reinforce the existence of such a general concept.

The remaining analysis of variables, 15 through 41, derived from the Biographical Data Form, appear in the appendix, since their detailed analysis, within the body of this report, is of importance primarily as supplemental information.

Factor Analysis:

Factor analysis processes were undertaken as a logical procedure whereby modifying variance could be partialed out, projecting a concise picture of the collateral relations existing within the study. In an effort to avoid contamination of possible bi-variance, wherein variables may appear with relatively high loadings on more than one factor, only the highest factor loading for each variable is accepted. This, in a real sense, acts as an arbitrary level of confidence for the purposes of this study. Where subsequent loadings of the same variable appear on other factors, and, as such, may be germaine to the discussion, they are so recognized.

TABLE 20: Factor 1: General Creativity

Variable Number	Variable	Measure	Loading
8	Originality	STO-C-3	.84492**
6	Originality	STO-B-3	.79932*
14	Originality	STO-D-3	.74851*
2	Originality	STO-A-3	.71261*
9	Fluency	Relationship Test	.57949*
4	Fluency	Brick Uses Test	.55720*
11	Flexibility	Relationship Test	.47391*
3	Flexibility	Item Variance	.44507*
13	Self-concept	Self-rating Scale	.36190*

**Factor Axis. *Highest Factor Loading.

The appearance of the STO measures within one factor can be accounted for with little difficulty since the study focuses on the development of such a general creativity measure and the structure necessarily reflects this concern. Of perhaps greater importance is the fact that every comparable general creativity variable selected for inclusion and consideration, in light of the limitations of the study, are found with their heaviest factor loading on the same, in this case, dominant, factor. In examining each variable across the eight-factor matrix, residual loadings beyond the primary factor are spread rather evenly over several factors and do not account for any significant variance within those factors. The order of appearance, within the general creativity factor, from highest to lowest loading of each variable, presents another interesting pattern. Aside from the fact that the four measure STO set tends to load together, the order of creativity traits from originality to fluency to flexibility to a self-concept of creative ability supports, in part, an earlier concept of a hierarchy of creativity characteristics (3).

TABLE 21: Factor 2: Intelligence

Variable Number	Variable	Measure	Loading
19	Scholastic Achievement	Bio. Data Form	.70224**
26	Reading Habits (Books)	Bio. Data Form	-.49916*
28	Work Environment	Bio. Data Form	.44272*
27	Reading Habits (Magazines)	Bio. Data Form	-.37007*
30	Radio Listening	Bio. Data Form	.35522
13	Self-Concept	Rating Scale	-.32699

**Factor Axis *Highest Factor Loading.

The factor analytic procedure utilized has meaningfully partialed out an intelligence factor based on scholastic achievement. Two negative loadings, both related to reading habits outside the school situation, are reflective of the reading accomplished in connection with school activities, perhaps leaving little time for independent reading outside the academic environment. Therefore, a negative loading would be reflective of in-school versus outside-school reading involvement.

The negative loading by "self-concept", while not the highest factor loading of this variable, is mentioned since it reflects the general lack of relationship between general creativity and intelligence. In this case, a negative loading indicates a low creativity self-concept, which would be in keeping with earlier findings of Barron and Torrance, wherein high scholastic achievement was, more often than not, coupled with low creative capacity.

Residual loadings of variables appearing in their highest loading on either factor 1, "general creativity", or factor 2, "intelligence", are well below any meaningful level worthy of consideration. This precise distinction between general creativity and intelligence is indeed a significant contribution to this study as well as to future clarity in designing or selecting general creativity sets for application to varying age and experience groups.

TABLE 22: Factor 3: Process Strategy

Variable Number	Variable	Measure	Loading
40	Outside Praise	Bio. Data Form	.71151**
39	Satisfaction	Bio. Data Form	.69262*
38	Process Change	Bio. Data Form	.69084*
41	Leadership	Bio. Data Form	.64466*
37	Process Concept	Bio. Data Form	.45487*

**Factor Axis *Highest Factor Loading.

Five process strategy items were inserted in the Biographical Data Form in order to disclose any possible influence of general creativity responses. The litems are: (in order of appearance in factor 3)

"23. When you complete a project of your own do others praise or admire the final results? (variable 40)

22. When completing a project of your own are you satisfied with the final results? (variable 39)

21. When beginning a project of your own, do you change your ideas while actually working on the project? (variable 38)

24. In group activities what would you consider yourself: always a leader, usually a leader, leader and follower equally, usually a follower or always a follower? (variable 41)

20. When beginning a project of your own do you usually imagine the completed product or outcome before actual work begins? (variable 37)"

Response to items 20, 21, 22, and 23 are arranged numerically by the following response sets; Never, Seldom, Sometimes, Often, Always.

The presence of a "motivational element" in the factor axis position is discounted by the fact that the cluster of items, as well as their relative loading strength, point to a closer identity with "strategy" within processes. Whether viewed as motivation or process strategy, both having strong internal similarities, the emergence of this factor leads to several interesting observations. First the influence of either can be reasonably discounted as a critical element within creative behavior. Secondly, both general creativity and intellectual ability, lacking relationship with each other, simultaneously are devoid of any serious dependence on motivation or process strategies.

TABLE 23: Factor 4: Maturity

Variable Number	Variable	Measure	Loading
15	Age	Bio. Data Form	.77604**
18	Grade Level	Bio. Data Form	.76998*
21	College Art Experience	Bio. Data Form	.69792*
29	Television Viewing	Bio. Data Form	-.63425
5	Visual Perception	Mutilated Words	.49088*
7	Visual Perception	Aesthetic Discr.	.48080*
20	Elementary Art Experience	Bio. Data Form	.45594*
1	Visual Perception	Hidden Figures	.44260*

**Factor Axis *Highest Factor Loading.

With chronological age as the factor axis, as well as the appearance of grade level and cumulative art experience as contributing variables, the label, "maturity", is quite logical. Each of these variables are directly dependent on chronological time and, it is assumed, maturity.

The presence of every "visual perception" variable within the study on this factor presents another interesting situation for speculation. Of primary importance to the objectives of this study, though, is the fact that maturation appears quite clearly outside the realm of influence in terms of creative behavior. At the same time, and perhaps of equal importance to the study at hand, is the fact that visual perception is equally devoid of concomitant relation to either intelligence or general creativity. Of secondary importance, but worth mentioning is the obvious relationship of visual perception to maturity or chronological age. The latter point is critical in the application of such measures to populations which cut across age and experience levels.

The remaining four factors, while accounting for residual variance, do not warrant detailed discussion herein. The rotated matrix of factor loadings appears in the appendix for further information.

CONCLUSIONS

The fact that this study is structured around specific objectives to be fulfilled, rather than broad hypotheses, diminished somewhat the importance of this particular section, but takes nothing away from its value in support of the stated objectives. Within the obvious limitations of this study, either stated or implied, the data sustains the following conclusions:

1. That "general creativity", while a composite in varying proportions of several primary creative abilities, can be isolated as an identifiable behavioral response, quite apart from factors of intelligence, strategy or maturation;

2. That the "general creativity" composite can, to some degree, be assessed through one or more of the primary creative abilities making up that composite;

3. That "originality", or "uncommonness of response" is a primary creative ability, a form of which is identifiable through the "Symbol Test of Originality".

Implications:

With the above general conclusions providing a substantial base of support, the specific objectives of this study are next weighed as to their having been accomplished:

1. "Develop and refine visual-verbal models of general creativity measures devoid of an intellectual bias, which would be applicable to individuals and/or groups with a broad age and experience range";

Data analysis indicated that no significant intellectual bias is evident within the STO measures applied, further that the STO can be applied to varying age and experience levels with no appreciable loss of sensitivity.

2. "Provide an adequate comparative base of accepted measures of general creativity against which new models may be examined in terms of establishing the existence of a 'general creativity' factor";

The existence of a 'general creativity' factor is amply evident through the emergence of the first and dominant factor, labeled "General Creativity". This factor demonstrates the interrelationship of the STO to comparative general creativity measures selected for inclusion within this area of concern.

3. "Submit such experimental measures and related general creativity measures to a general school population sampling for subsequent analysis";

This objective was accomplished through the structural method involved in the study.

4. "Provide researchers initially, and educators upon adequate validation, with a comprehensive, valid, sensitive, and economically feasible measure of general creativity";

The experimental measures developed through this study are justifiably comprehensive in that findings support their direct relation to existent measures of general creativity. In particular, the comprehensiveness and validity of the STO measures developed is substantiated through the scoring structure employed which is designed with originality or uncommonness of response as an integral part of the scoring procedure. The comprehension of the STO is further enhanced by the fact that it is relatively culture-free, due to the objective nature of its administration and scoring format. The sensitivity of the STO is readily evident through an examination of the demonstrated range of response sets within this study. Previous studies lend support, as well, to the demonstrated sensitivity of the STO to both test/re-test change as a result of treatment intervals, and individual response ranges within a given population. The economic feasibility of the STO as a measure of general creativity is illustrated by the fact that it is a simple instrument to prepare, to administer, to respond to, as well as, score.

5. "Add to the basic research literature, information regarding the potential, limitations, and feasibility of such a visual-verbal measure of general creativity";

This objective is accomodated through each of the previous objectives being fulfilled.

6. "Establish a sound base upon which valid group norms may beset forth regarding such general creativity measures as may be developed in item one, above".

The sampling technique utilized herein provides a meaningful foundation for the future establishment of valid group norms in scoring the STO.

7. "Build upon findings herein, as well as through existing literature, toward the eventual development of non-discursive measures of general creativity".

The development of the STO provides a viable bridge between present totally verbal and entirely non-discursive measures of general creativity of the future, in that it presents a visual stimuli eliciting a verbal or written response. The quality of the response is less critical than its conformity to group response sets, pointing to a

potential relationship with non-discursive measurement.

Applied with the necessary caution of experimental research design, the STO lends itself well to the needs of researchers concerned with the area of general creativity. The potential usefulness of the STO has not been fully exploited, especially the inherent flexibility of scoring and varying dimensions in applying resultant scoring structures. As a simple and direct tool, it is able to provide an initial sorting of respondents into meaningful categories regarding uncommonness of response patterns. Beyone this gross analysis, groups and individuals can easily be ranked as to standing within a given set of response patterns.

The value of the STO lies not so much in the measure itself, but in the sophistication with which its scoring procedure is accomplished. There is relatively little innovative technique in the construction of the measure or in the simplicity of its application. Whatever uniqueness the measure may claim is derived from its interpretation of originality through an extremely flexible scoring mechanism which is relatively devoid of any necessity for subjective evaluation.

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APPENDIX

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APPENDIX A

THE SYMBOL TEST OF ORIGINALITY (STO)

Scoring Procedure:

STO scoring procedure is based upon each participant's uncommonness of response, in relation to a given group, or each item on the measure.

Initial scoring requires the item tabulation of responses and following that procedure, responses are weighted as to their frequency within the given group. Weighting is ascribed as follows:

a. zero points; no response,
b. one point; three or more responses,
c. two points; two responses, and,
d. three points; unique responses.

The STO-A-3:

The scoring indicated below is a cumulative scoring procedure based on a total number of 1298, ranging in age from 6 through 46 years. Included are the respondents (N=478) utilized within the present study.

TABLE A-1: Scoring Structure: STO-A-3: N=1298

Item	One point responses	Two point responses
1.	bullseye, circle, coil, confusion, continuous, dizzy, jellyroll, maze, shell, snail, snake, spin, spinning, spiral, spring, string, swirl, target, tunnel, vertigo, whirlpool, wind-tunnel.	candy, depth, space, sun, tornado, web, well.
2.	christianity, circle, compass, cross, gunsight, gyroscope, intersection, periscope, religion, satellite, scope, sight, sign, star, target, telescope.	airplane, radar, squares, stop, sun, weathervane, worth
3.	arch, arrow, arrowhead, cap, church, hat, letter "A", point, rocket, spaceship, steeple, teepee, tent, triangle, uplifting.	boomerang, cone, forward, mountain, pyramid, up.

TABLE A-1 continued

Item	One point responses	Two point responses
4.	bread, bun, cotton, hot dog, letter "B", number "8", packages, shoes, skiis, weiner	brand, capsul, fingers, pancakes, soft, tanks, togetherness, tire, T.V. Antenna, undivided, weight.
5.	curve, direction, fishhook, harpoon, hook, two "2".	arrow, cane, catch, arrowhead, umbrella.
6.	diamond, ferris wheel, lemon, octagon, orange, spider web, umbrella, wagon wheel, window.	asterisk, pie.
7.	electricity, lightning, sta , steps, thunder, zig-zag.	anger, excitment.
8.	block, box, curtain, drum, envelope, mountain, pyramids, square, triangles, window.	geometry, perspection, road, sign, "V".
9.	bell, broom, candlabra, chalice, cup, flower, fork, glass, goblet, pitchfork, saddle, shield, shovel, stirrup, trident, tuning fork, tulip.	devil, tongue.
10.	Delta's triangles, fence, mountains, saw, shark's teeth, teepee's, teeth, tents, trees.	crown, four ("4"), pyramids, sharp, spikes.
11.	barbed wire, coil, cord, curly cue, curly hair, hair, loops, pig tails, scribbles, spring, squiggles, waves, wire.	child, confusing, corkscrew, everlasting, "etc", fence, happiness, heads, movement, smoke.
12.	angel, bow, donkey, ears, face, rabbit, scissors, swords, tee-pee, windmill.	antenna, bennie, butterfly, chairs, clippers, cross, eyes, flags, hat, nose, tent.

TABLE A-1 continued

Item	One point responses	Two point responses
13.	circle, egg, frame, mirror, oval, picture, slate, pool, rectangle, square, television.	confined, hole, lemon, soup, watermelon.
14.	cobblestones, eggs, fence, hills, jumped, lace, lumps, mountains, scallops, stones, teeth, uniforms.	caterpillar, finger tips, p peas, worms.
15.	arrow, fish hook, hook, musical, note, weathervane.	airplane, code, direction, earth, equator, horizon, indian, propeller, quick, saturn, sun.
16.	cones, cups, diamond, eye, geometry, hat, ice cream cone, paper cups, spinning top, top.	gyroscope, dot, kite.
17.	all to do with time and timers, bow, clock, glass, hourglass, "X".	chair, cross, table, tie.
18.	ball, box, circle, circle within square, door, frame, plate, square, square within circle, table, window.	marbles, geometry.
19.	beading, beads, chain, circles, necklace, "o's" repetition, rocks, teeth.	apples, ball, dots, eggs, marbles, movement, peas, rope, together, worm.
20.	ball, circle, cross, earth, gunsight, pie, R.R. sign, round, scope, sights, stop signs, wheel, windows, world.	shield, target, telescope.

TABLE A-2: Scoring Structure: STO-B-3 N=478

Item	One point responses	Two point responses
1.	cartiogram, fire, flames, graph, grass, ice, icicles, mountains, stalagmites, waves.	hair.

TABLE A-2 continued

Item	One point responses	Two point responses
2.	all about wind, arrow, hooks, hooks, symbol, musical note, note, propeller, sign, symbol.	airplane, code, dizzy, golf, horizon, indecision, line.
3.	circle, coil, confusion, dizzy, eternity, maze, snail, snake, spider, spider web, spin, spring, swirl, whirlpool.	ball, candy, curl, design, hair, road, roll, sun, tension.
4.	blotted out words, cloth, cross hatch, fence, forest, grass, hair, hay, haystack, mistake, scribbles, sticks, weeds, wheat, woods, wheat, "X".	berries, dark, fear, night, shade, teepees
5.	electricity, lightning, stairs, steps, zig zag.	grass, waves.
6.	mountains, hills, pyramids, teepees, tents, triangles.	crown, Tri-Delt, indians.
7.	ball, beads, chain, chair, circles, eggs, golf balls, marbles, necklace, pearls, pebbles, rocks, stones.	beans, line, movement, peas, zero.
8.	chinese, hills, letters, letters, mountains, scribble, teeth water, waves. word. writing.	anger, grass, trees.
9.	all about trees, bananas, claws, feather, fingers, hair, leaves, palm leaves, trees, waves.	bird's beaks, bushes, chinese, flowers, scribbling.
10.	boulders, bumps, eggs, fence, graves, hills, igloos, lumps, mountains, pebbles, rocks.	caterpillar, heads, hoops, road, toes, trees, worm.
11.	all wire, coil, curls, curly, curly hair, "E's", hair, letters, loops, pig's tail, scribble, smoke, spiral, spring, squibbles, water, waves.	continuous, happiness, string, rope, string, worm.

TABLE A-2 continued

Item	One point responses	Two point responses
12.	commas, hair, ink blots, lines, lion's stripes, marks, parenthesis, sound, sound waves, stripes, tiger, tiger stripes, waves, zebra.	curves, eye lashes, grass, people, shadow, weeds.
13.	butterfly, flag, kite.	cup, envelope, pants, parachute, pitcher, square, umbrella, tent, triangles, "X".
14.	bubbles, cells, crowd, fence, fruit, grapes, hair, pebbles, people, rocks, soap, stone fence, stone wall, stones, trash, wall.	balls, candy, coal, food, money.
15.	all about time, clock, glass, hourglass, time, timer.	bow, chair, cross, figure, stool, table, "X".
16.	fish hook, hook.	arrow, harpoon.
17.	circle, half, half circle, half spiril, half wheel, half target, spiral, sun, target, tunnel.	all about trees, hurricane, incomplete, maze, half a log, half a rug, racetrack, sound waves, tire.
18.	fence, grass, lines, people, rain, trees, tree trunks.	hair, parallels, radar waves, sound waves, vertical, wood.
19.	aim, compass, cross, direction, gunsight, periscope, satellite, scope, site, sun, telescope.	cross with moon, life, pointed, signal, star.
20.	ground, grain, lake, ocean, river, road, sea, water, waves.	clouds, horizon, lines, shading, sky, wind.

TABLE A-3: Scoring Structure: STO-C-3 N=478

Item	One point responses	Two point responses
1.	arrows, compass, crossroads, directions, intersection, weather, weather vane, wind indicator.	cross, everywhere, highway direction.

TABLE A-3 continued

Item	One point responses	Two point responses
2.	aim, ball, circle, cross, division, equal, gun-sight, half circle, periscope, pie, quarters, railroad, scope, sight, sign, stop sign, target, telescope, wheel, window.	point, radar, radar screen, top.
3.	anything jewish, star, triangles.	design, religion.
4.	arrowhead, mountain, point, pyramid, rectangle, teepee, teepee, tent, triangle.	cone, Delta, dunce cap, tree, up.
5.	block, box, cube, diagonal, divided, envelope, flag, half a square, sandwich, square, triangle.	kite, sign.
6.	cinnamon roll, circles, coil, confusion, curl, lolly pop, maze, roll, snake, spin, spiral, spring, swirl, target, tornado, tunnel, whirlpool, worm.	curved, depth, dizzy, eternity, puzzle, road, shell, string, sun, tension.
7.	anything german, communism, cross, german cross, Hitler, nazi, swastika.	puzzle, sign, symbol.
8.	asterisk, bright, design, flower, light, rays, snow, flake, star, sun.	birth, fire, firecracker, spokes.
9.	civil defense, circle, defense, encircled triangle, fall out shelter, geometry, shelter, sign, symbol, triangle, triangle in circle.	ball, segments.
10.	cross, crossing, cross roads, incorrect, intersection, location, multiply, railroad, "X".	mark, poison, spot, treasure.

TABLE A-3 continued

Item	One point responses	Two point responses
11.	battlements, border, buildings, castle, castle wall, egyptian, fort, Greece, greek frieze, indian design, roman, squares, wall.	crank, door, fence, line, puzzle, room, skyline, windows.
12.	field, ground, lake, ocean, river, road, shade, water, wood, wood grain.	wind.
13.	clover, cross, flower, german, german cross, iron cross, maltese cross, surfer, surfer's cross, symbol, windmill.	charm, fan, medal, metal, nazi, nazi cross, pinwheel, propeller, swank, swastika, triangles.
14.	ball, box, box in circle, circle, circle with box, design, encircled, enclosed, geometry, square, square encircled, symbol.	design, hole, picture.
15.	fence, hills, lightning, lines, mountains, saw, static, teepees, teeth, wave, zig zag.	indian sign, jagged, points, spikes.
16.	boxes, diamond, square, star.	design, geometric, jewish, movement, overlayed, stop sign.
17.	butterfly, clover, daisy, flower, propeller.	leaves, ribbon.
18.	atom, balls, barbells, batons, cross, jacks, lights, molecular, snow, snowflake, toy, weather, weather vane, wind direction, windmill, windvane.	
19.	box, circle, geometry, sign, square, symbol, target.	ball, design, gate, kite, window.

TABLE A-3 continued

Item	One point responses	Two point responses
20.	"C's", curls, curly cues, decoration, design, fence, ocean, pattern, railing, sea, sled, sled harness, sleigh, surf, water, waves.	wood shavings.

TABLE A-4: Scoring Structure: STD-G-3 S-478

Item	One point responses	Two point responses
1.	ball, circle, divided circle, equal, horizon, one half, one half circle, pie, sign.	earth, eye, hole, moon, half a moon, port holes, screw, water line.
2.	baseball, baseball diamond, diamond, kite, road sign, sign, triangle.	cross, star.
3.	Christ, christian, christianity, cross, crucifix, Jesus, religion.	add, plus.
4.	church, church window, circle, circle with triangle, sail, sight, stained glass window, symbol, target, tree, triangle, window.	abstract, arrow, arrowhead, civil defense, christmas tree, disign, flag, geometric, keyhole.
5.	cross, crossroads, directions, intersection.	paper clips, plus, propeller, railroad, sign.
6.	circle, flat tire, incomplete, one half, onion, half circle, half target, tire, tunnel.	lines, maze, half spiral, sound waves, spring, tree, tree stump, water, waves.
7.	arrow, cone, down, rectangle, sign, triangle, yield.	angles, cup, diamond, paper cup, point, pointer, tooth, wedge.
8.	ball, circle, moon, pie, sun, zero.	completeness, infinity, nothing, orange, wheel, world, tunnel.

TABLE A-4 continued

Item	One point responses	Two point responses
9.	child's writing, good, grass, hills, letters, mountains, scribble, script, Um, water, waves, word, writing.	bored, brush, fire, hair, ridges, scared, worries.
10.	cross, cross mark, incorrect, letter, marker, multiply, railroad, wrong.	crossing, crossroads.
11.	"C's", curls, decoration, design, fence, hair, ornament, sled, sleigh, surf, water, waves.	movement, railing, rails.
12.	cross, design, emblem, flower, german, horns, iron cross, maltese cross, star, surfer, surfer's cross.	box, medal, nazi, ornate, trumpets, wheel, windmill.
13.	block, box, boy, cube, square.	dull, window.
14.	add, cross, crossing, crossroad, intersection, plus.	compass, death, seasons, sign, "X".
15.	atom, bullseye, center, circle, circled dot, dot, eye, target, wheel.	ball, belly button, button, geometry, hole, point, top, zero.
16.	bubbles, coal, cobblestones, food, fruit, grapes, gravel, pebbles, rocks, smoke, stone fence, stones, trash, wall.	cells, crowd, eggs, jewells, junk, mess, molecules, money, "o's", people, train.
17.	cross, flower, iron cross, maltese cross, medal, snowflake, surfer, surfer's cross.	arrows, Blue Max, christianity, design, Germany, honor, symbols, windmill.
18.	bananas, boats, christmas tree, claws, leaves, pine trees, tree limbs, trees, water, waves.	feathers, japanese.
19.	star.	

TABLE A-4 continued

Item	One point responses	Two point responses
20.	camel, curved line, hills, humps, mountains, rope, snake, string, worm, water, wavey.	ghosts, movement, rolling, wavy lines.

APPENDIX B

VARIABLE DESCRIPTIONS

VARIABLE NUMBER	VARIABLE TITLE	NUMBER ITEMS	SCORE RANGE	DESCRIPTION
1	Visual Perception	10	0-10	Hidden Figures test
2	Originality	20	0-60	Symbol Test of Originality (SYS-A-3)
3	Flexibility	5	0- 5	Item Variation Between Measures
4	Fluency	Open	0-40	Guilford's Brick Uses Test
5	Visual Perception	24	0-24	Thurston's Mutilated Words Test
6	Originality	20	0-60	Symbol Test of Originality (SYS-B-3)
7	Aesthetic Discrimination (visual perception)	9	0- 9	Eisenbach's Test of Aesthetic Discrimination
8	Originality	20	0-60	Symbol Test of Originality (SYS-C-3)
9	Fluency	Open	0-24	Taylor's Relationship Test (Modified)
10	Component Identification	Open	0-24	Taylor's Relationship Test (Modified)
11	Functional Identification (Flexibility)	Open	0-24	Taylor's Relationship Test (Modified)
12	Form Identification	Open	0-24	Taylor's Relationship Test (Modified)
13	Self Concept	21	0-105	Self Rating Scale
14	Originality	20	0-60	Symbol Test of Originality (SYS-D-3)
15	Age	Open	9-23	Age in Years
16	Sex	2	1- 2	Male-1; Female-2
17	Environment	5	1- 5	Rural to Large City variation
18	Grade Level	9	1- 9	Fifth Grade to College variation
19	Scholastic Ability	9	1- 9	Grade Average F to A+
20	Elementary & Secondary Art Experience	13	0-12	Previous School art Experience by years
21	College Art Experience	9	1- 9	College experience by number of courses
22	Outside Art Experience	5	0- 4	Art experience outside school by courses
23	Independent Poetry Creation	5	0- 4	Writing of poems outside of school
24	Independent Drawing Creation	5	0- 4	Drawing experience outside of School
25	Independent Writing	5	0- 4	Story writing experience outside of school

APPENDIX B

VARIABLE DESCRIPTION

VARIABLE NUMBER	VARIABLE TITLE	NUMBER ITEMS	SCORE RANGE	DESCRIPTION
26	Outside Reading Habits	9	0- 8	Books read in last month
27	Outside Reading Habits	9	0- 8	Magazines read in last month
28	Work Environment	3	1- 3	Best work accomplished school, home or elsewhere
29	Television Viewing	5	0- 4	Amount of television viewing
30	Radio Listening	5	0- 4	Amount of radio listening
31	Sibling Relation	Open	0- 4	Number of younger brothers
32	Sibling Relation	Open		Number of older brothers
33	Sibling Relation	Open		Number of younger sisters
34	Sibling Relation	Open		Number of older sisters
35	Home Assistance	9	1- 9	Assistance from family to outside
36	Arts Related Personnel	2	1- 2	Friends or relatives in Art (yes-1, no-2)
37	Strategies	5	0- 4	Imagining and product pre-project
38	Strategies	5	0- 4	Flexibility in process
39	Strategies	5	0- 4	Satisfaction with product
40	Strategies	5	0- 4	Outside praise for product
41	Leadership	5	1- 5	Active to Passive

APPENDIX C

TABLE 1. VARIABLE 15: Age
Open; range 0-25 (Age in years)

Subgroup	N	X	S.D.	.01% r w/Variables
1	33	10.909	2.127	-
2	27	12.333	0.832	
3	122	13.295	1.44[illegible]	-2, 012, 013, -40
4	30	14.567	0.6[illegible]	31
5	47	16.789	1.7[illegible]	-
6	68	18.119	2.070	5, 8, 10, 16, 21, 22, 37
7	51	21.118	5.631	4, 21, 33, -41
8	69	19.348	4.611	21, -39
9	31	23.065	5.972	22, 23

TABLE 2. VARIABLE 16: Sex
2 Items; range 1-2 (Male-1, Female-2)

Subgroup	N	X	S.D.	.01% r w/Variables
1	33	1.485	0.619	-
2	27	1.444	0.557	25
3	122	1.443	0.515	-2
4	30	1.300	0.535	25, 30, 31
5	47	1.553	0.503	23
6	68	1.663	0.477	11, 15
7	51	1.882	0.325	4, 21, 33, -41
8	69	1.551	0.501	-19, -35
9	31	1.581	0.502	-

TABLE 3. VARIABLE 17: Environment
5 Items, range 1-5 (Rural to large city variations)

Subgroup	N	X	S.D.	.01% r w/Variables
1	33	3.788	1.386	-
2	27	4.519	0.700	-
3	122	4.115	1.038	-32
4	30	4.033	1.608	10, 29
5	47	3.957	1.250	-
6	68	3.691	1-406	-
7	51	3.490	1.317	20
8	69	3.536	1.357	-34
9	31	3.839	0.969	-

APPENDIX C

TABLE 4. VARIABLE 18: Grade level
9 Items; range 1-9 (5th Grade to college variations)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33			-
2	27	6.000	0.001	-
3	122	7.000	0.001	-
4	30	8.000	0.002	-
5	47	9.000	0.001	-
6	68			
7	51			
8	69			
9	31	14.774	1.257	-

TABLE 5. VARIABLE 19: Scholastic ability
9 Items; range 1-9 (Grade average F to A+)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	3.606	1.560	-13
2	27	3.333	2.166	-
3	122	3.607	1.567	-24
4	30	5.368	1.474	28
5	47	4.787	1.444	-7, -8
6	68	4.676	1.398	-1, -13
7	51	4.627	1.113	23, 24
8	69	5.261	1.421	-
9	31	4.742	0.893	-

TABLE 6. VARIABLE 20: Elementary and Secondary Art Experience
13 Items; range 0-12 (Previous School art Experience by years)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	9.182	5.621	1
2	27	15.407	7.386	-
3	122	19.303	8.472	-
4	30	19.167	13.406	-
5	47	31.532	17.980	
6	68	32.147	21.015	9, 13, 40
7	51	26.980	20.826	24, 25
8	69	38.420	22.635	22
9	31	37.226	29.044	-

APPENDIX C

TABLE 7. VARIABLE 21: College Art Experience
9 Items; 1-9 range (College Experience by number of courses)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33			
2	27			
3	122			
4	30			
5	47	0.574	1.363	-
6	68	1.353	2.244	3, 5, 15
7	51	2.078	2.314	15, 22
8	69	0.826	2.114	15
9	31	6.032	1.991	-8, 15

TABLE 8. VARIABLE 22: Outside Art Experience
5 Items; range 0-4 (Art Experience outside by courses)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	0.152	0.44]	-
2	27	0.481	1.112	-
3	122	0.697	1.329	24, 25, 40
4	30	0.167	0.747	32
5	47	0.426	0.994	-
6	68	0.412	0.996	15
7	51	0.431	0.994	15
8	69	0.362	0.822	24, 25, -29
9	31	0.581	1.148	15

TABLE 9. VARIABLE 23: Independent Poetry Creation
5 Items; range 0-4 (writing of poems outside of school)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	2.697	1.104	-
2	28	2.037	0.898	-
3	122	2.057	1.007	24, 25, 40
4	30	1.733	0.823	25
5	47	1.723	0.971	24, -29
6	68	2.353	1.243	25
7	51	1.980	1.049	24, 25, -41
8	69	1.942	1.110	2, 3, 24, 25
9	31	2.065	0.964	-

APPENDIX C

TABLE 10. VARIABLE 24: Independent Drawing Creation
5 Items; range 0-4; (Drawing experience outside of school)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	3.606	1.059	1, 25
2	27	3.704	1.031	-
3	122	3.844	1.012	13
4	30	3.300	1.535	14
5	47	3.723	1.136	25
6	68	3.574	1.114	13, 25
7	51	3.176	1.228	-
8	69	3.275	1.259	-
9	31	3.613	1.116	-

TABLE 11. VARIABLE 25: Independent writing
5 items; range 0-4 (story writing experience outside of school)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	2.576	1.173	-31, 32
2	27	1.963	0.854	-
3	122	2.221	1.008	13, 26, 27
4	30	2.000	1.174	-1, 26
5	47	1.979	0.921	-
6	68	2.324	1.309	26
7	51	1.941	0.858	-
8	69	1.884	1.105	-
9	31	1.806	1.046	8, 26

TABLE 12. VARIABLE 26: Outside reading habits
9 Items; range 0-8 (Books read in last month)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	4.636	2.289	27
2	27	4.481	2.007	7
3	122	4.623	2.206	7, 27
4	30	3.167	2.730	27
5	47	2.596	2.213	27
6	68	2.559	2.378	27
7	51	1.843	1.953	27
8	69	2.246	2.138	-
9	31	2.000	1.915	-

APPENDIX C

TABLE 15. VARIABLE 27: Outside reading habits
9 Items; range 0-8 (magazines read in last month)

Subgroup	N	$\bar{X}$	S.D.	.01 r w/Variables
1	33	3.427	2.784	30
2	27	3.296	2.284	-
3	122	4.607	2.501	7, 9
4	30	3.767	2.944	14, 30
5	47	4.043	2.095	-
6	68	4.029	2.381	13
7	51	4.176	2.027	13
8	69	4.203	2.026	8
9	31	4.323	1.939	-

TABLE 14. VARIABLE 28: Work Environment
3 Items; 1-3 Range (Best work done at school, home or elsewhere)

Subgroup	N	$\bar{X}$	S.D.	.01 r w/Variables
1	33	3.939	1.345	-
2	27	2.815	0.786	-
3	122	1.533	0.619	30
4	30	1.667	0.606	8, 14
5	47	1.872	0.679	-
6	68	1.515	0.560	-
7	51	1.725	0.723	-
8	69	1.763	0.783	-
9	31	1.484	0.677	-

TABLE 15. VARIABLE 29: Television viewing
5 Items; Range 0-4 (amount of television viewing)

Subgroup	N	$\bar{X}$	S.D.	.01 r w/Variables
1	33	3.697	1.045	-
2	27	3.852	0.907	-
3	122	3.623	0.982	30
4	30	3.533	1.008	8, 9, 10, 14, 37
5	47	3.213	1.062	-
6	68	2.779	0.960	-
7	51	2.471	0.674	-
8	69	2.841	0.994	-15, -32
9	31	2.290	0.588	-

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TABLE 16. VARIABLE 30: Radio Listening
5 Items; 0-4 Range (amount of radio listening)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	3.000	1.031	-
2	27	3.222	1.013	-
3	122	3.451	0.946	5
4	30	3.267	1.143	4, 11, 14, 31, 38
5	47	3.191	0.851	-
6	68	3.441	0.870	-
7	51	3.216	0.832	-
8	69	3.391	0.808	-
9	31	2.968	0.605	-

TABLE 17. VARIABLE 31: Sibling Relation
Items -Open; Range 0-4 (Number of younger brothers)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	0.424	0.561	-
2	27	0.556	0.698	-
3	122	0.689	0.824	-
4	30	0.800	0.925	-
5	47	0.766	0.937	-
6	68	0.544	0.818	35
7	51	0.471	0.784	-
8	69	0.681	0.993	-
9	31	0.903	1.106	-

TABLE 18. VARIABLE 32: Sibling R lation
Items -Open; Range (Number of older brothers)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	0.697	0.728	-
2	27	0.704	0.952	-
3	122	0.639	1.076	-
4	30	0.667	0.802	15
5	47	0.362	0.680	-
6	68	0.471	0.680	-
7	51	0.451	0.923	-
8	69	0.493	0.797	36
9	31	0.200	0.588	-

APPENDIX C

TABLE 19. VARIABLE 33: Sibling Relation
Items Open (Number of younger sisters)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	0.394	0.496	-
2	27	0.481	0.802	-
3	122	0.664	0.933	-
4	30	0.433	0.679	38
5	47	0.660	0.915	-
6	68	0.750	0.952	-
7	51	0.412	0.616	10
8	69	0.681	0.947	-
9	31	0.613	0.803	-40

TABLE 20. VARIABLE 34: Sibling Relation
Items Open (Number of older sisters)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	0.848	0.906	-
2	27	0.741	0.656	-
3	122	0.607	0.932	-
4	30	0.433	0.626	-
5	47	0.532	0.776	-
6	68	0.368	0.571	-
7	51	0.529	0.784	10
8	69	0.551	1.207	-
9	31	0.323	0.653	-

TABLE 21. VARIABLE 35: Home Assistance
9 Items; Range 1-9 (assistance from family outside)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	2.061	1.999	-
2	27	2.593	2.978	-
3	122	2.238	2.231	36
4	30	1.200	0.961	14
5	47	2.277	2.243	-
6	68	2.147	2.475	-
7	51	2.020	2.534	14
8	69	1.812	2.024	-
9	31	2.710	2.648	-

APPENDIX C

TABLE 22. VARIABLE 36: Arts Related Personnel
2 Items; Range 1-2 (friends or relatives in art; yes-1, no-2)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	1.364	0.652	-
2	27	1.333	0.679	-
3	122	1.393	0.583	-
4	30	1.400	0.724	-
5	47	1.447	0.503	41
6	68	1.279	0.569	-
7	51	1.510	0.505	-
8	69	1.391	0.599	-
9	31	1.323	0.541	-

TABLE 23. VARIABLE 37: Strategies
5 Items; Range 0-4 (Imagining end product Pre-project)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	2.970	1.489	-
2	27	3.259	1.509	-
3	122	3.787	1.173	13
4	30	2.900	1.213	9
5	47	3.468	0.952	-
6	68	3.500	1.140	15
7	51	3.725	0.961	38, 39, 40
8	69	3.768	1.238	-
9	31	3.677	1.194	-

TABLE 24. VARIABLE 38: Strategies
5 Items; Range 0-4 (Flexibility in process)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	2.970	1.185	39, 40
2	27	3.111	0.751	-
3	122	3.992	1.024	40, 41
4	30	2.467	2.937	40
5	47	3.106	0.814	-
6	68	3.176	0.992	39, 40, 41
7	51	3.431	0.640	-
8	69	3.188	0.959	40, 41
9	31	3.677	1.013	39, 40

APPENDIX C

TABLE 25. VARIABLE 39: Strategies
5 Items; Range 0-4 (Satisfaction with product)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	3.091	1.308	-3, 40
2	27	3.074	0.616	-
3	122	3.107	1.027	40, 41
4	30	3.800	1.157	39, 40
5	47	3.043	0.955	-
6	68	3.147	0.996	40, 41
7	51	3.314	0.761	-
8	69	3.275	0.998	40
9	31	3.167	0.820	40, 41

TABLE 26. VARIABLE 40: Strategies
5 Items; 0-4 Range (Outside praise for product)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	3.939	1.345	1
2	27	2.895	0.786	5
3	122	2.934	1.026	13, -15, 41
4	30	2.567	1.040	-
5	47	3.191	0.851	-41
6	68	3.235	0.979	13, 41
7	51	3.471	0.644	0
8	69	3.290	0.893	41
9	31	3.323	0.871	41

TABLE 27. VARIABLE 41: Leadership
5 Items; Range 1-5 (Active to passive)

Subgroup	N	$\bar{X}$	S.D.	.01% r w/Variables
1	33	2.636	1.356	3
2	27	3.519	0.893	-
3	122	3.066	1.104	-
4	30	2.667	1.127	-
5	47	3.191	0.647	-41
6	68	2.956	0.999	-
7	51	3.098	0.728	-15
8	69	2.957	0.898	-
9	31	3.032	0.75]	-13

APPENDIX B

THE ROTATED MATRIX OF FACTOR LOADINGS

	F 1	F 2	F 3	F 4	F 5	F 6	F 7	F 8
1	0.12904	0.17455	-0.20173	-0.44260	0.22886	-0.08900	0.21673	-0.10132
2	0.71261	-0.16330	0.04273	0.00601	0.07708	-0.04295	0.07453	0.02248
3	0.44507	0.13410	0.19371	-0.06700	-0.06561	-0.26006	-0.17765	0.13396
4	0.55720	0.10063	-0.17162	-0.18073	0.09074	0.03392	-0.03456	0.04149
5	0.32973	-0.12920	-0.19418	-0.49088	0.21121	-0.17706	0.02005	0.01514
6	0.75932	-0.10544	0.04420	-0.18331	0.04204	0.02230	0.06895	0.05257
7	0.02623	0.06619	-0.04492	-0.48080	-0.05488	0.03471	0.00987	0.16874
8	0.84452 *	-0.02593	-0.00313	-0.10733	-0.02106	0.04002	0.02090	0.06420
9	0.57949	0.00439	-0.21184	-0.25708	0.04987	0.15038	0.00826	-0.06489
10	0.00807	0.07197	-0.06372	-0.23272	-0.02229	-0.02205	-0.23629	-0.08237
11	0.47351	-0.08097	-0.11957	-0.30021	-0.03512	0.26672	-0.40686	-0.10341
12	0.06442	0.01140	-0.07648	-0.01691	0.02203	-0.01318	0.63416 *	0.08507
13	0.36150	0.32699	0.01173	-0.00158	0.08064	-0.17447	-0.08150	0.19311
14	0.74851	-0.00929	-0.03609	-0.10797	-0.06285	0.03390	0.05041	0.02052
15	0.20968	-0.15556	-0.04122	-0.77604 *	0.03371	0.04411	-0.12868	-0.12033
16	-0.07134	0.02272	-0.22937	-0.34727	-0.25962	0.06286	-0.36714	0.25219
17	-0.02167	0.05316	-0.10548	0.20679	0.42711	-0.05223	-0.16833	0.01929
18	0.29602	-0.25917	-0.06446	-0.76558	0.09890	0.04337	-0.01067	-0.14287
19	0.03346	-0.70224 *	0.02612	-0.12450	0.00563	-0.00023	-0.03419	-0.12174
20	0.18855	-0.03632	-0.09067	-0.45594	0.32185	-0.11790	0.10907	0.21519
21	0.14526	0.03892	-0.09756	-0.69792	0.11233	-0.10436	-0.10035	-0.01422
22	0.01686	0.26753	-0.06101	-0.12802	0.38311	-0.13499	-0.11110	0.24161
23	0.06057	-0.06668	-0.03854	-0.04387	-0.12936	0.04451	0.02639	0.78092 *
24	0.02387	0.07054	-0.10857	0.06182	0.21251	0.01048	0.17215	0.60996
25	0.11223	0.10465	-0.00726	0.06354	0.01128	0.06668	-0.07494	0.73336
26	0.03324	0.45916	0.04340	0.42569	0.01648	0.19612	-0.15022	0.30511
27	0.27955	0.37007	-0.13785	0.06581	0.21380	0.05347	-0.32021	0.19822
28	0.14747	-0.44272	-0.00868	0.06586	-0.08043	0.03609	-0.04409	0.12926
29	-0.11674	-0.07924	-0.05876	0.63435	0.29558	-0.18131	-0.06106	0.03046
30	0.03821	-0.35522	-0.10107	0.21781	0.21894	-0.14121	-0.42313	0.12648
31	-0.03777	0.03036	0.12879	-0.03256	0.15953	0.68663 *	-0.03213	-0.03152
32	-0.03402	0.12132	0.02192	0.08009	-0.53367 *	-0.17520	-0.13739	0.08801
33	0.03964	-0.03616	0.03232	0.04035	0.04173	0.62722	0.05443	0.13892
34	-0.13876	-0.07982	0.03080	0.07039	-0.42661	-0.20171	-0.14006	0.04711
35	0.07709	-0.00207	-0.18363	0.02402	-0.21833	0.29585	-0.11532	0.02285
36	0.05398	-0.08201	-0.13934	0.11514	-0.39192	0.02849	0.21403	-0.20916
37	0.10792	0.25365	-0.45487	-0.10866	0.05630	-0.11039	0.13149	0.10349
38	-0.01019	-0.10239	-0.65084	-0.14547	0.06189	0.04698	-0.11522	0.03179
39	-0.00604	0.05888	-0.65262	-0.06384	-0.03954	-0.03647	-0.01013	0.07315
40	0.09613	0.06579	-0.71151 *	-0.20988	0.05340	-0.03148	-0.07345	0.17626
41	0.01761	-0.14048	-0.64466	0.14291	0.00117	0.01645	0.08028	-0.21373

* Factor Axis. Underlined Variables-highest factor loading.

APPENDIX D

SYMETRIC CORRELATION MATRIX

NUMBER CASES 478

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0.074														
3	0.041	0.245													
4	0.190	0.238	0.186												
5	0.353	0.213	0.189	0.295											
6	0.163	0.585	0.317	0.412	0.344										
7	0.230	0.011	0.032	0.208	0.249	0.106									
8	0.126	0.557	0.329	0.423	0.298	0.707	0.096								
9	0.261	0.340	0.104	0.404	0.279	0.391	0.138	0.438							
10	0.093	-0.010	0.011	0.039	0.110	0.068	0.092	0.066	0.132						
11	0.143	0.268	0.153	0.331	0.242	0.350	0.115	0.357	0.579	0.064					
12	0.097	0.035	-0.052	0.067	0.073	0.032	0.051	0.054	0.224	-0.041	-0.226				
13	0.093	0.196	0.194	0.177	0.105	0.220	0.017	0.263	0.159	-0.034	0.059	-0.048			
14	0.083	0.424	0.275	0.387	0.294	0.584	0.073	0.644	0.360	0.051	0.314	0.046	0.179		
15	0.268	0.157	0.073	0.260	0.372	0.305	0.252	0.284	0.328	0.167	0.375	-0.004	0.019	0.208	
16	-0.016	-0.094	0.096	0.058	0.145	0.018	0.171	0.032	0.111	0.149	0.215	-0.037	-0.000	0.014	0.225
17	-0.045	0.009	-0.016	-0.009	0.016	-0.063	-0.104	-0.026	-0.013	0.037	-0.032	-0.006	0.079	-0.085	-0.100
18	0.355	0.217	0.113	0.227	0.505	0.345	0.306	0.283	0.352	0.096	0.356	0.019	0.041	0.237	0.745
19	-0.061	0.101	-0.085	-0.020	0.139	0.076	0.305	0.049	0.055	0.081	0.064	-0.025	-0.148	0.031	0.205
20	0.289	0.140	0.135	0.236	0.335	0.258	0.145	0.179	0.217	0.003	0.165	0.030	0.118	0.211	0.313
21	0.241	0.179	0.149	0.201	0.355	0.196	0.237	0.178	0.213	0.130	0.245	-0.016	0.109	0.200	0.635
22	0.089	0.030	0.042	0.095	0.053	0.075	0.020	0.067	0.049	0.056	0.013	-0.002	0.110	0.042	0.103
23	-0.058	0.058	0.163	0.072	0.013	0.080	0.108	0.123	0.041	-0.007	0.045	0.035	0.084	0.049	-0.064
24	0.089	0.073	0.001	0.064	0.018	0.069	0.046	0.038	-0.008	-0.057	-0.081	0.029	0.158	0.027	-0.133
25	-0.086	0.063	0.104	0.066	0.019	0.087	0.019	0.128	0.042	0.015	0.031	0.007	0.180	0.088	-0.057
26	-0.141	-0.075	0.051	0.018	-0.253	-0.105	-0.074	-0.009	-0.094	-0.072	-0.155	-0.008	0.127	-0.033	-0.366
27	0.113	0.113	0.132	0.191	0.109	0.121	0.105	0.207	0.153	0.041	0.114	-0.018	0.218	0.135	0.008
28	-0.006	0.079	-0.034	0.072	0.009	0.097	0.012	0.099	0.095	-0.044	0.082	-0.022	0.033	0.077	0.075
29	-0.216	-0.088	-0.038	-0.102	-0.237	-0.217	-0.225	-0.197	-0.162	-0.096	-0.219	-0.005	0.008	-0.216	-0.428
30	-0.046	0.044	0.025	0.035	0.062	-0.032	0.019	-0.012	0.007	-0.030	0.046	-0.032	-0.012	-0.005	-0.092
31	0.006	-0.013	-0.065	-0.013	-0.079	0.013	0.001	0.001	0.018	0.022	0.074	-0.056	-0.015	-0.012	-0.017
32	-0.107	-0.079	0.054	-0.029	-0.109	-0.128	-0.021	-0.066	-0.078	-0.058	-0.051	-0.036	0.047	-0.042	-0.108
33	-0.071	0.021	-0.022	0.009	-0.045	0.054	0.015	0.058	-0.005	-0.065	0.079	0.036	-0.033	0.044	-0.006
34	-0.059	-0.071	-0.061	-0.113	-0.149	-0.095	-0.003	-0.113	-0.127	0.030	-0.079	-0.058	-0.083	-0.097	-0.070
35	-0.037	0.038	-0.044	0.074	0.006	0.026	0.029	0.017	0.050	-0.015	0.099	-0.031	0.022	0.084	0.088
36	-0.007	0.013	-0.053	-0.086	-0.044	-0.011	-0.069	0.023	0.004	0.022	-0.028	0.052	-0.041	-0.022	-0.037
37	0.141	0.056	0.016	0.191	0.147	0.033	0.143	0.063	0.166	0.035	0.045	0.046	0.121	0.121	0.048
38	0.154	-0.004	-0.041	0.116	0.193	0.055	0.066	0.054	0.084	0.040	0.092	-0.013	0.003	0.056	0.175
39	0.107	-0.029	-0.045	0.052	0.141	-0.003	0.029	0.009	0.122	0.053	0.100	0.006	0.106	0.029	0.083
40	0.223	0.071	0.015	0.192	0.249	0.093	0.127	0.130	0.221	0.116	0.179	0.005	0.158	0.110	0.164
41	0.061	0.017	-0.050	0.073	0.050	-0.016	-0.053	0.020	0.046	-0.025	0.018	0.015	-0.202	0.041	-0.036

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
17	-0.038														
18	0.155	-0.155													
19	-0.070	-0.034	0.319												
20	0.111	0.010	0.411	0.081											
21	0.164	-0.030	0.560	0.046	0.305										
22	0.048	0.086	-0.022	-0.168	0.211	0.177									
23	0.204	0.053	-0.071	-0.067	0.092	0.024	0.112								
24	0.007	0.036	-0.113	-0.177	0.163	0.025	0.168	0.368							
25	0.105	0.110	-0.143	-0.119	0.101	-0.023	0.186	0.506	0.300						
26	-0.005	0.113	-0.408	-0.300	-0.140	-0.249	0.147	0.150	0.167	0.289					
27	0.022	0.116	0.035	-0.130	0.096	0.059	0.165	0.081	0.141	0.224	0.416				
28	-0.013	-0.085	0.065	0.187	-0.025	-0.048	-0.057	0.067	0.024	-0.038	-0.019	0.003			
29	-0.215	0.172	-0.431	-0.078	-0.146	-0.345	0.019	-0.063	0.122	0.045	0.182	0.046	0.010		
30	0.099	0.054	-0.031	0.101	-0.024	-0.107	-0.000	-0.001	0.055	0.028	0.016	0.163	0.073	0.218	
31	0.014	0.035	0.046	0.021	0.002	-0.051	-0.062	-0.014	0.043	-0.028	0.095	0.008	0.026	-0.087	-0.074
32	0.027	-0.102	-0.122	0.009	-0.089	-0.079	-0.067	0.051	-0.033	0.027	0.070	0.061	-0.015	-0.050	0.010
33	-0.005	-0.053	0.039	-0.000	0.017	-0.075	0.001	0.058	0.047	0.085	0.119	0.073	-0.035	-0.017	0.004
34	0.064	-0.076	-0.110	0.023	-0.093	-0.097	-0.073	-0.042	0.009	-0.048	0.031	-0.066	0.079	0.032	0.024
35	0.014	-0.009	0.006	-0.028	-0.075	0.068	-0.071	-0.022	0.100	0.080	0.017	0.039	0.018	-0.042	0.046
36	-0.009	-0.032	-0.004	0.098	-0.071	-0.085	-0.192	-0.043	-0.174	-0.089	-0.048	-0.107	0.014	0.040	-0.074
37	0.126	0.101	0.098	-0.067	0.178	0.085	0.084	0.059	0.185	0.080	0.032	0.183	-0.050	-0.055	-0.051
38	0.195	0.049	0.188	0.059	0.122	0.190	0.111	0.069	0.026	0.008	-0.104	0.094	-0.008	-0.028	0.072
39	0.122	0.019	0.068	-0.058	0.094	0.086	0.062	0.063	0.080	0.086	-0.026	0.082	0.025	-0.044	-0.017
40	0.236	0.037	0.188	-0.053	0.207	0.171	0.160	0.156	0.131	0.115	-0.056	0.138	-0.013	-0.101	0.051
41	0.049	0.037	0.008	0.059	-0.014	0.018	-0.008	-0.076	-0.015	-0.143	-0.065	-0.018	0.011	0.067	0.029

	31	32	33	34	35	36	37	38	39	40
32	-0.101									
33	0.196	-0.015								
34	-0.085	0.158	-0.078							
35	0.052	0.051	0.060	0.051						
36	-0.033	0.070	0.007	0.069	0.065					
37	-0.072	-0.034	-0.081	-0.064	0.026	0.037				
38	0.006	-0.022	0.002	-0.033	0.129	0.014	0.193			
39	-0.112	-0.032	-0.024	-0.029	0.081	-0.010	0.206	0.345		
40	-0.064	-0.030	0.013	-0.063	0.020	-0.032	0.284	0.482	0.499	
41	-0.068	-0.027	-0.011	-0.038	0.053	0.082	0.157	0.343	0.305	0.254

PROJECT TEST BATTERY

APPENDIX F

DIRECTIONS FOR ADMINISTRATION OF TESTS

First pass out test booklets to the group. Inform the group that any questions they may have will be answered by you, otherwise it would be appreciated if there would be no talking during the testing period. Have the group follow silently the directions on the cover page as you read the first four paragraphs aloud. When you are sure the directions are understood, have the entire group turn to page one. Again have the group read the directions silently as you read the first test directions aloud. Upon reading the last line of the test directions, "Wait for the signal to begin," ask if there are any questions. If none, or after answering questions, tell the group that they will have five (5) minutes in which to complete the test--then say, "BEGIN". Time the group, and at the end of five minutes, have the group stop and turn to page two. Have the group follow your reading of the directions for each test to themselves. Follow the same procedure as for test one on each test. Each test will have a different amount of time given, as follows:

Number of Test	Page	Time	Number of Test	Page	Time
1-HF-5	1	5 minutes	7-STO-C-3	9	3 minutes
2-STO-A-3	2	3 minutes	8-RT-3	10	3 minutes
3-BU-5	3	5 minutes	9-SR-2	11	2 minutes
4-MW-4	4	4 minutes	10-STO-D-3	12	3 minutes
5-STO-B-3	5	3 minutes	11-BD-NT	13-14	no time limit
6-DP-2	6-8	2 minutes			

The entire test battery will take approximately 40 to 45 minutes to administer. Since the last is informational and not timed, it would help younger groups to have each item read for them. Try to answer all questions for the group before beginning. Answer individual questions after the test starts at the students desk; no not interrupt the group once they have begun. Do not permit individuals to return to completed sections of the booklet or attempt to change answers on parts completed. When the entire group has completed the entire test booklet, gather them up before any discussion of the tests. It is particularly important that individual test directions are carefully followed. Be sure the directions are understood thoroughly before giving the signal to begin a test.

INSTRUCTIONS: On the following pages there is a collection of various tests, measures and questions. You are asked to respond to each as honestly and frankly as you can. It will be very important to this project that you make your own choice or put down your own answer rather than what you think others might choose, answer or expect you to answer.

Read each set of directions carefully with your instructor. If you have any questions, ask them before the test begins so as not to waste test time. You are asked not to turn back to previous tests once the signal to stop has been given.

No names will be gathered or used, instead a code number will be assigned to your test booklet. Your instructor will receive a copy of group scores later in the year, but individual scores will not be available.

You are asked to work quickly, but carefully, since each section is timed. You will be informed as to how much time you will have, and will be given a signal to begin and a signal to stop. There will generally be enough time to complete each section with no difficulty.

Thank you for your assistance in this project.

The measures within this booklet are intended for research purposes only. Project under U.S.O.E. No. 8168.

CODE_____

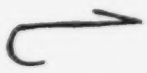
In this test you are to write the <u>one word</u> which you feel each symbol means or what it looks like in the space next to it. Do not worry about spelling. Answer each item. Work quickly, but carefully. Wait for the signal to begin.

1. _____

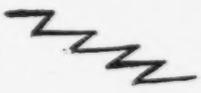
2. _____

3. _____

4. _____

5. _____ 

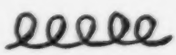
6. _____

7. _____ 

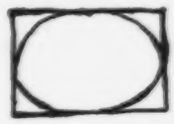
8. _____

9. _____

10. _____

11. _____ 

12. _____

13. _____ 

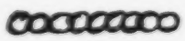
14. _____

15. _____

16. _____

17. _____

18. _____

19. _____ 

20. _____

CONTINUE ON THE NEXT PAGE

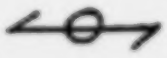
In this test you are to list as many uses as you can think of for a brick. Write as quickly as you can. Give all the uses you can think of. Your answers do not have to be complete sentences. You may use short phrases or single words. Use one line for each answer. List all the uses for a brick you can think of when the signal is given.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____
26. _____
27. _____
28. _____
29. _____
30. _____
31. _____
32. _____
33. _____
34. _____
35. _____
36. _____
37. _____
38. _____
39. _____
40. _____

CONTINUE ON THE NEXT PAGE

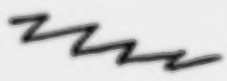
In this test you are to write the <u>one</u> <u>word</u> which you feel each symbol means or what it looks like in the space next to it. Do not worry about spelling. Answer each item. Work quickly, but carefully. Wait for the signal to begin.

1. _____

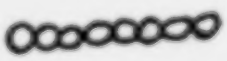
2. _____ 

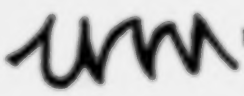
3. _____

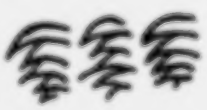
4. _____

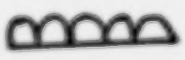
5. _____ 

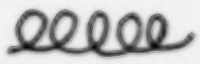
6. _____

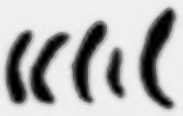
7. _____ 

8. _____ 

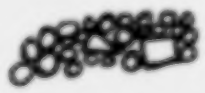
9. _____ 

10. _____ 

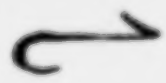
11. _____ 

12. _____ 

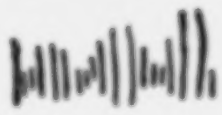
13. _____

14. _____ 

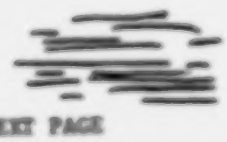
15. _____

16. _____ 

17. _____

18. _____ 

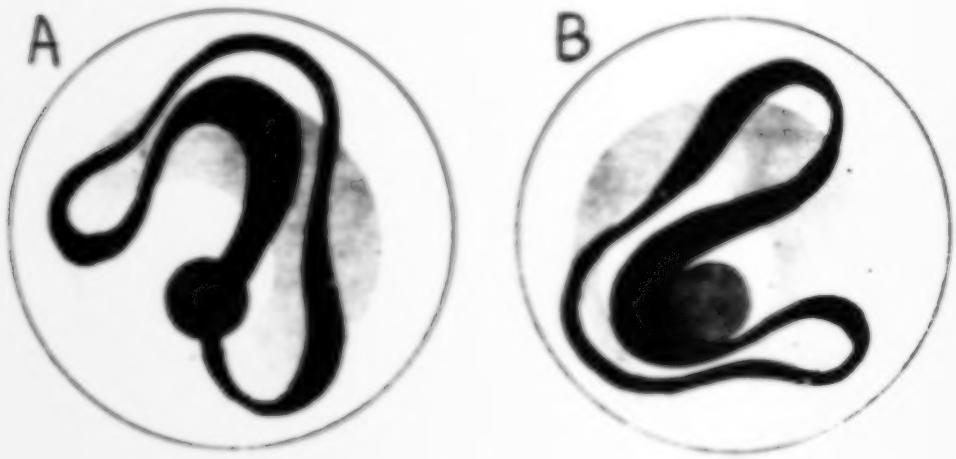
19. _____

20. _____ 

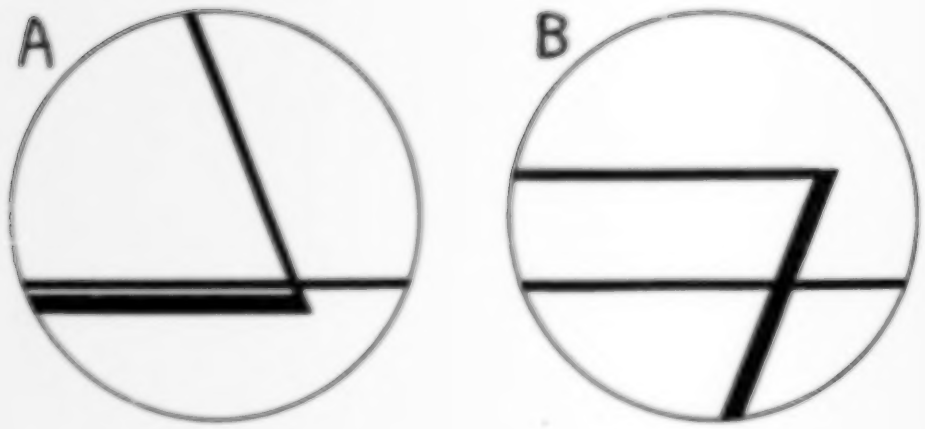
CONTINUE ON THE NEXT PAGE

In this test you are to choose the design which you like the best. In each item there are two designs, one labeled "A" and one labeled "B". You are to indicate on the line provided either "A" or "B" depending on which you prefer. Work quickly, but carefully. Begin working at the signal.

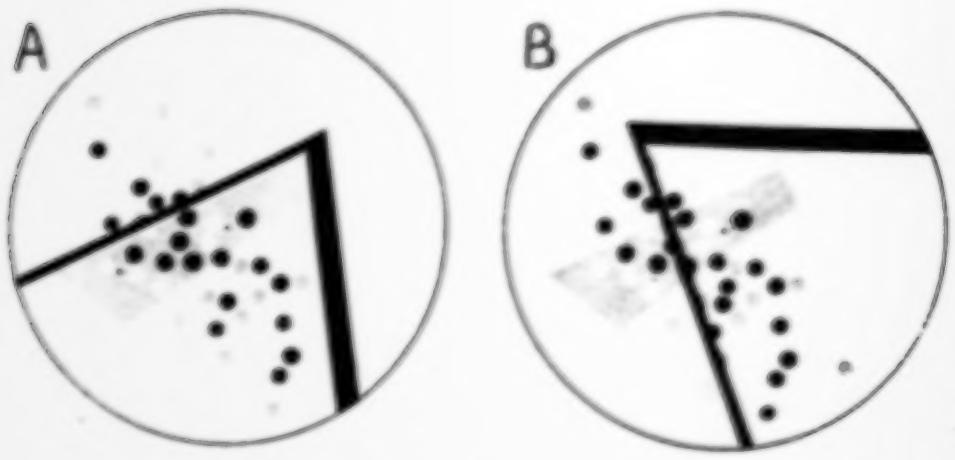
1._____



2._____

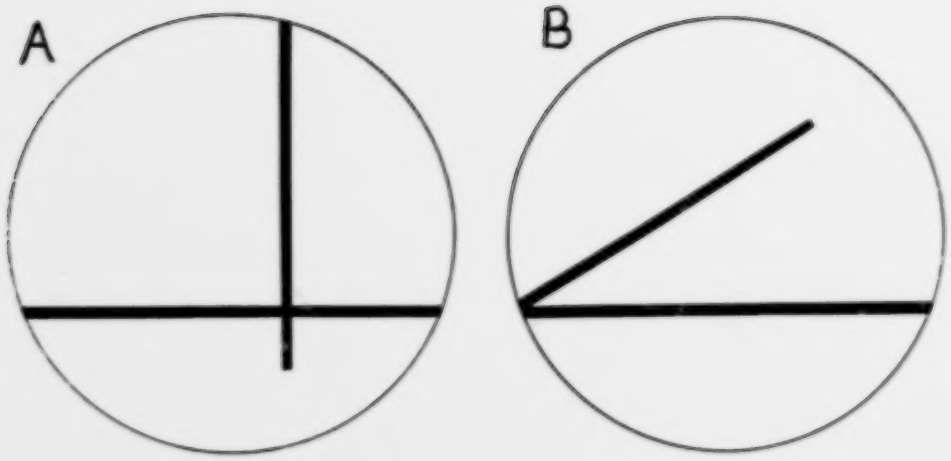


3._____

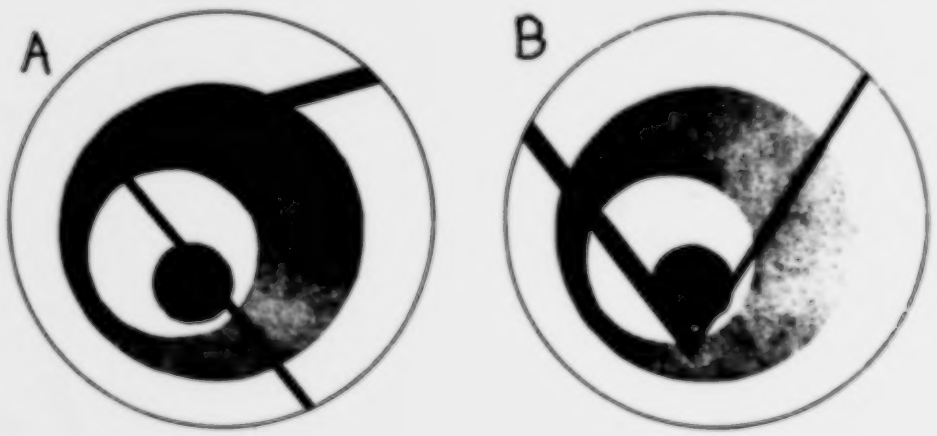


CONTINUE ON THE NEXT PAGE

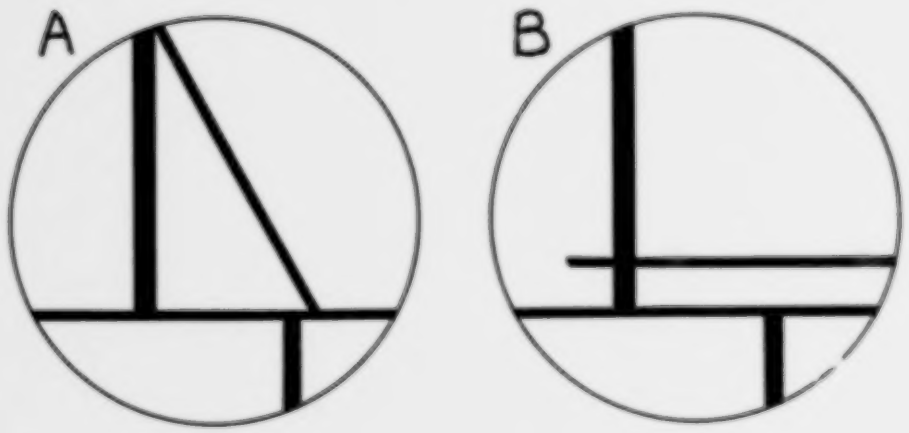
4. _____



5. _____

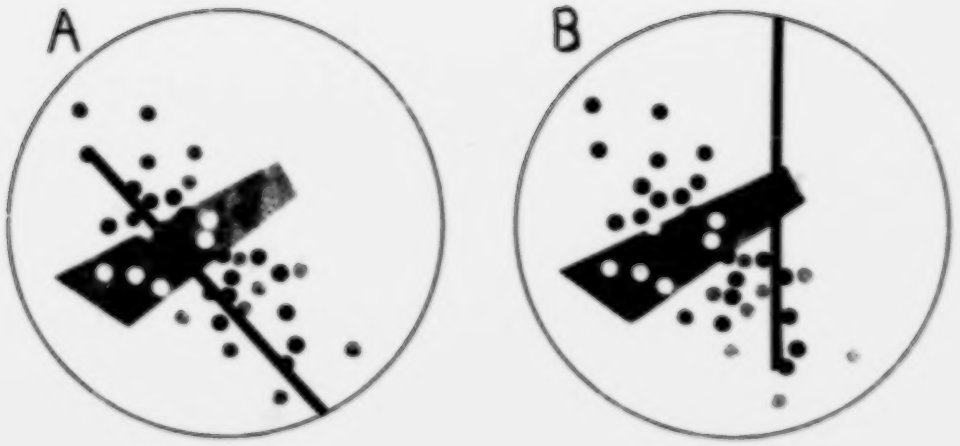


6. _____

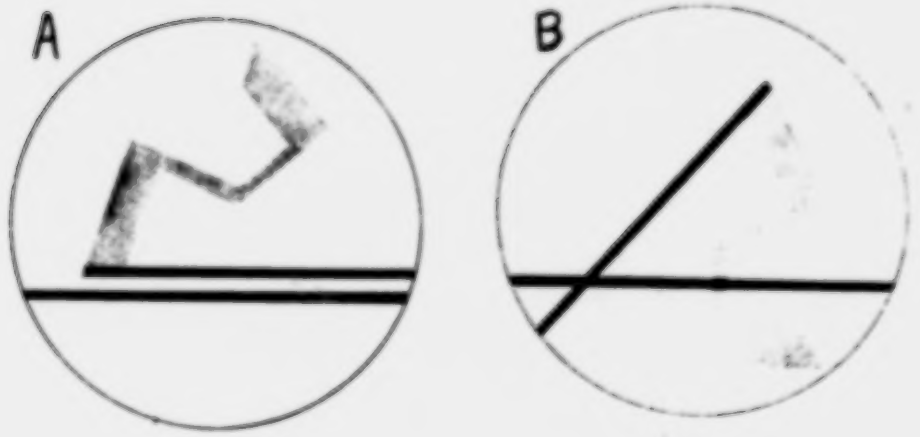


CONTINUE ON THE NEXT PAGE

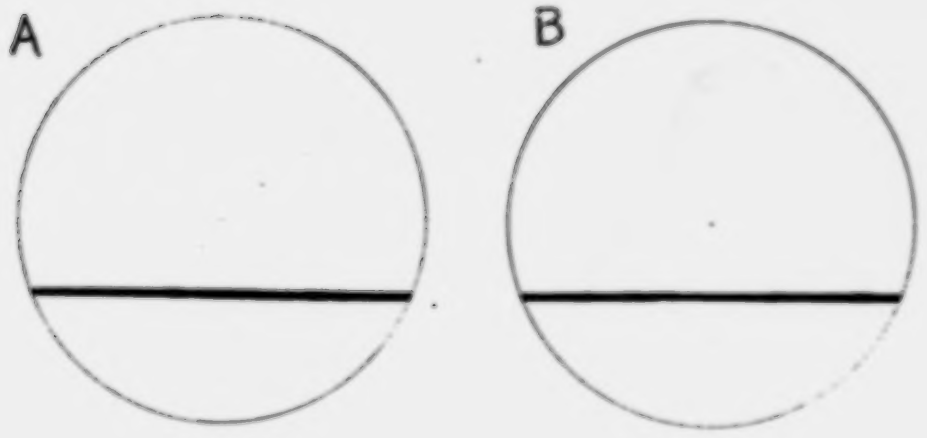
7._____



8._____



9._____



STOP HERE. WAIT FOR FURTHER DIRECTIONS

In this test you are to write the <u>one word</u> which you feel each symbol means or what it looks like in the space <u>next to</u> it. Do not worry about spelling. Answer each item. Work quickly, but carefully. Wait for the signal to begin.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

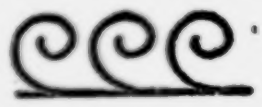
15. _____

16. _____

17. _____

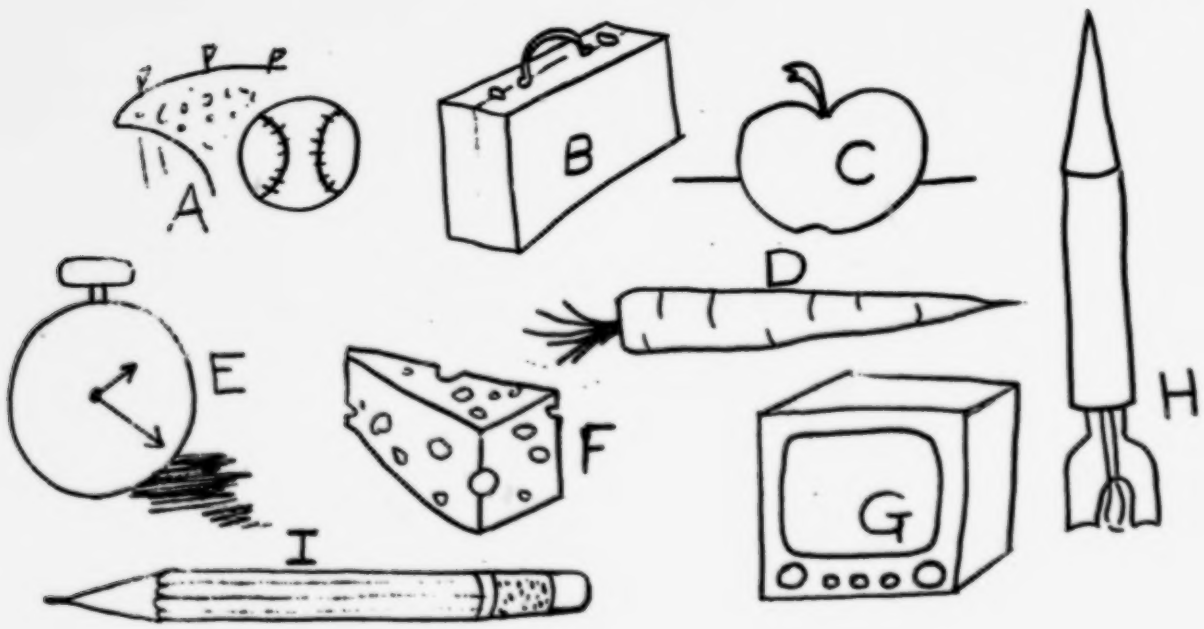
18. _____

19. _____

20. _____ 

STOP HERE. WAIT FOR FURTHER DIRECTIONS.

In this test you are to select as many groups of three things as you can which have something in common, from the nine objects below. Each object has a letter on it or near it. You are to choose three objects which have something in common, put their letters on the three spaces provided, and write what each group has in common on the line below. Work quickly, but carefully. You may use each letter more than once if you like.
Begin when the signal is given.



1. Letters:___ ___ ___
   Reason:_____

2. Letters:___ ___ ___
   Reason:_____

3. Letters:___ ___ ___
   Reason:_____

4. Letters:___ ___ ___
   Reason:_____

5. Letters:___ ___ ___
   Reason:_____

6. Letters:___ ___ ___
   Reason:_____

7. Letters:___ ___ ___
   Reason;_____

8. Letters:___ ___ ___
   Reason:_____

9. Letters:___ ___ ___
   Reason:_____

10. Letters:___ ___ ___
    Reason:_____

11. Letters:___ ___ ___
    Reason:_____

12. Letters:___ ___ ___
    Reason:_____

13. Letters:___ ___ ___
    Reason:_____

14. Letters:___ ___ ___
    Reason:_____

In this portion you are to rate yourself in the areas listed below. The rating scale goes from 5 or "high" to 1 or "low". You are to circle the number which best reflects how you feel about yourself regarding the area indicated. This would be a general estimate, taking all things into consideration in your judgment. Begin at the signal.

CHARACTERISTIC	HIGH	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	LOW
Intelligence	5	4	3	2	1
Sense of humor	5	4	3	2	1
Physical coordination	5	4	3	2	1
Personal independence	5	4	3	2	1
Personal courage	5	4	3	2	1
Physical energy	5	4	3	2	1
General dependability	5	4	3	2	1
Social grace & skills	5	4	3	2	1
Planning ability	5	4	3	2	1
Originality of ideas	5	4	3	2	1
Inclination to adventure	5	4	3	2	1
Ability to change	5	4	3	2	1
General Sensitivity	5	4	3	2	1
Attention to details	5	4	3	2	1
General skill & coordination	5	4	3	2	1
General creativity	5	4	3	2	1
Sophistication	5	4	3	2	1
Inhibitions	5	4	3	2	1
Seriousness & Caution	5	4	3	2	1
Success	5	4	3	2	1
General estimate of self	5	4	3	2	1

STOP HERE. WAIT FOR FURTHER DIRECTIONS.

In this test you are to write the one word which you feel each symbol means, or what it looks like in the space next to it. Do not worry about spelling. Answer each item. Work quickly, but carefully. Wait for the signal to begin.

1. _____

2. _____

3. _____

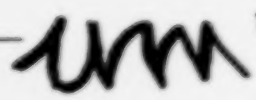
4. _____

5. _____

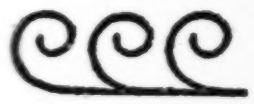
6. _____

7. _____

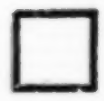
8. _____

9. _____ 

10. _____

11. _____ 

12. _____

13. _____ 

14. _____

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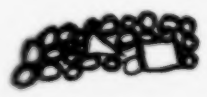
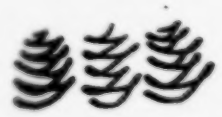
16. _____ 

17. _____

18. _____ 

19. _____

20. _____

STOP HERE. WAIT FOR FURTHER DIRECTIONS.

This portion asks question about you and in some cases your opinion. Read each question carefully before responding. Please answer each item as well as possible.

1. Birthdate:_____ 2. Sex: Male____ Female____
month year

3. Lived the greater part of your life: on a farm or rural area___ in a small village___ in a small town___ in a small city___ in a large city___

4. Present grade or level in school: 5th___ 6th___ 7th___ 8th___ 9th___ 10th___ 11th___ 12th___ College: Freshman___ Sophomore___ Junior___ Senior___ Grad___ Adult Education Class Member___ Other(indicate)_____

5. Estimate your overall scholastic average for all school work taken to date:
A+___ A___ B+___ B___ C+___ C___ D+___ D___ F___

6. Check the grades in which you remember having art experiences: 1st___ 2nd___ 3rd___ 4th___ 5th___ 6th___ 7th___ 8th___ 9th___ 10th___ 11th___ 12th___

7. If a college student, indicate the approximate number of college art courses you have taken or are presently taking: one___ two___ three___ four___ five___ between 5 & 10___ between 10 & 15___ between 15 & 20___ over 20___

8. Have you ever taken art courses or lessons outside of school: none___ one___ two___ three to five___ more than five___

9. Other than school assignments, do you ever write poems:
Never___ Seldom___ Sometimes___ Often___ Very Often___

10. Other than school assignments, do you ever sketch or draw pictures:
Never___ Seldom___ Sometimes___ Often___ Very Often___

11. Other than school assignments, do you ever write stories:
Never___ Seldom___ Sometimes___ Often___ Very Often___

12. Other than school assignments, approximately how many books have you read this month:
0___ 1___ 2___ 3___ 4___ 5___ 6 to 10___ 10 to 15___ over 15___

13. Other than school assignments, how many magazines have you read this month:
0___ 1___ 2___ 3___ 4___ 5___ 6 to 10___ 10 to 15___ over 15___

14. Where do find you do your best work: in school___ at home___ Elsewhere(indicate)

15. How often do you watch television:
Never___ Seldom___ Often___ Very Much___ Too Much___

16. How often do you listen to the radio:
Never___ Seldom___ Often___ Very Much___ Too Much___

17. How many brothers and sisters do you live with(have you lived with): (indicate number)
younger brother(s)_____ younger sister(s)_____
older brother(s)_____ older sister(s)_____

18. Who gives you the most assistance at home: (check one) mother___ father___ older brother___ older sister___ younger brother___ younger sister___ other relative___ neighbor___ a friend___

19. Have you any close friends or relatives who are artists, musicians, writers, actors, or who are somehow related to the arts: yes___ no___ If yes, indicate their field and relationship to you:_____

20. When beginning a project of your own do you usually imagine the completed product or outcome before actual work begins:
Never_____ Seldom_____ Sometimes_____ Often_____ Always_____

CONTINUE ON TO THE NEXT PAGE.

21. When beginning a project of your own, do you change your ideas while actually working on the project:
Never_____ Seldom_____ Sometimes_____ Often_____ Always_____

22. When completing a project of your own are you satisfied with the final results:
Never_____ Seldom_____ Sometimes_____ Often_____ Always_____

23. When you complete a project of your own do others praise or admire the final results:
Never_____ Seldom_____ Sometimes_____ Often_____ Always_____

24. In group activities what would you consider yourself: always a leader_____
usually a leader_____ leader & follower equally_____ usually a follower_____
always a follower_____

WHEN YOU HAVE COMPLETED THIS PAGE, CLOSE THE BOOKLET, FACE DOWN, ON YOUR DESK. DO NOT RETURN TO OTHERS SECTIONS OF THE BOOKLET. WAIT FOR FINAL INSTRUCTIONS FROM YOUR INSTRUCTOR.

Thank you.